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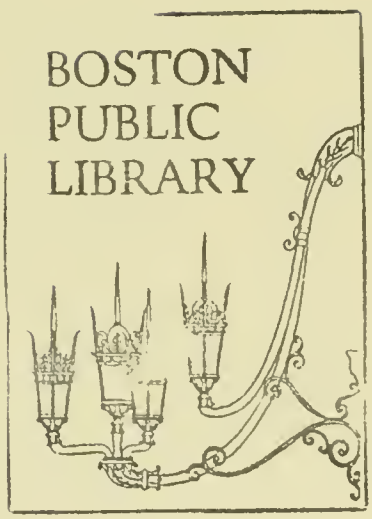
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GREATER BOSTON WHOLESALE MARKET ASSOCIATES, INC.

AND

DOWNTOWN WATERFRONT CORPORATION

Boston, Massachusetts

REPORT

NEW WHOLESALE MEAT MARKET CENTER

Boston, Massachusetts

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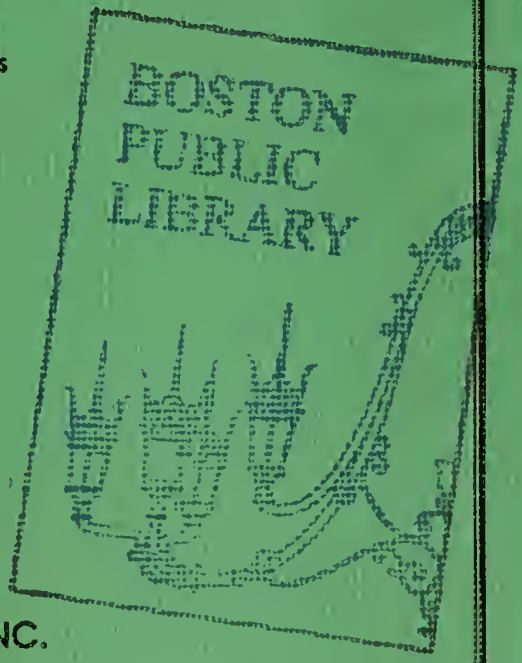

CHAS. T. MAIN, INC.

BOSTON, MASSACHUSETTS CHARLOTTE, NORTH CAROLINA

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January, 1966

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CHAS. T. MAIN, INC.
441 STUART STREET
BOSTON, MASSACHUSETTS 02116

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BRANCH OFFICE
1301 EAST MOREHEAD STREET
CHARLOTTE, N.C. 28204

January 6, 1966

2527-1-1
2532-1-1

Mr. Frank A. Christian
Downtown Waterfront Corporation
Greater Boston Chamber of Commerce
125 High Street
Boston, Massachusetts

Mr. Edward J. Logue
Boston Redevelopment Authority
City Hall Annex
Boston, Massachusetts

and

Mr. Duncan Cotting, President
Greater Boston Wholesale Market Associates
121 Clinton Street
Boston, Massachusetts

Gentlemen:

In accordance with our agreements of June 30, 1965, and in conjunction with our consultants, Henschien, Everds and Crombie of Chicago, we have completed the preliminary engineering studies required to establish the general and individual arrangement of a wholesale market complex suitable for relocation of meat dealers being displaced from the Downtown Waterfront - Faneuil Hall Redevelopment areas. Based upon these preliminary layouts and plans, we have prepared the necessary estimates of construction and other costs.

Our preliminary arrangement provides facilities for 31 dealers in two multiple-occupancy buildings, plus 2 dealers in a duplex building, and 7 dealers, plus a cold storage warehouse company each in individual buildings. Expansion space is available. A boiler-engine room building will serve the multiple-occupancy buildings, plus the duplex and two

of the single occupancy buildings. A general office building could provide space for a bank, brokers offices, and other activities related of the market operation. An incinerator is provided to serve this market area.

We estimate that the cost of the entire project will be approximately $17,066,400.

The estimated time from the signing of a design contract to completion of construction would be approximately two years. This can vary dependent upon individual dealer requirements and the type of contracts the dealer corporation wishes to award. A staging plan is included to permit earlier occupancy by a few critical dealers.

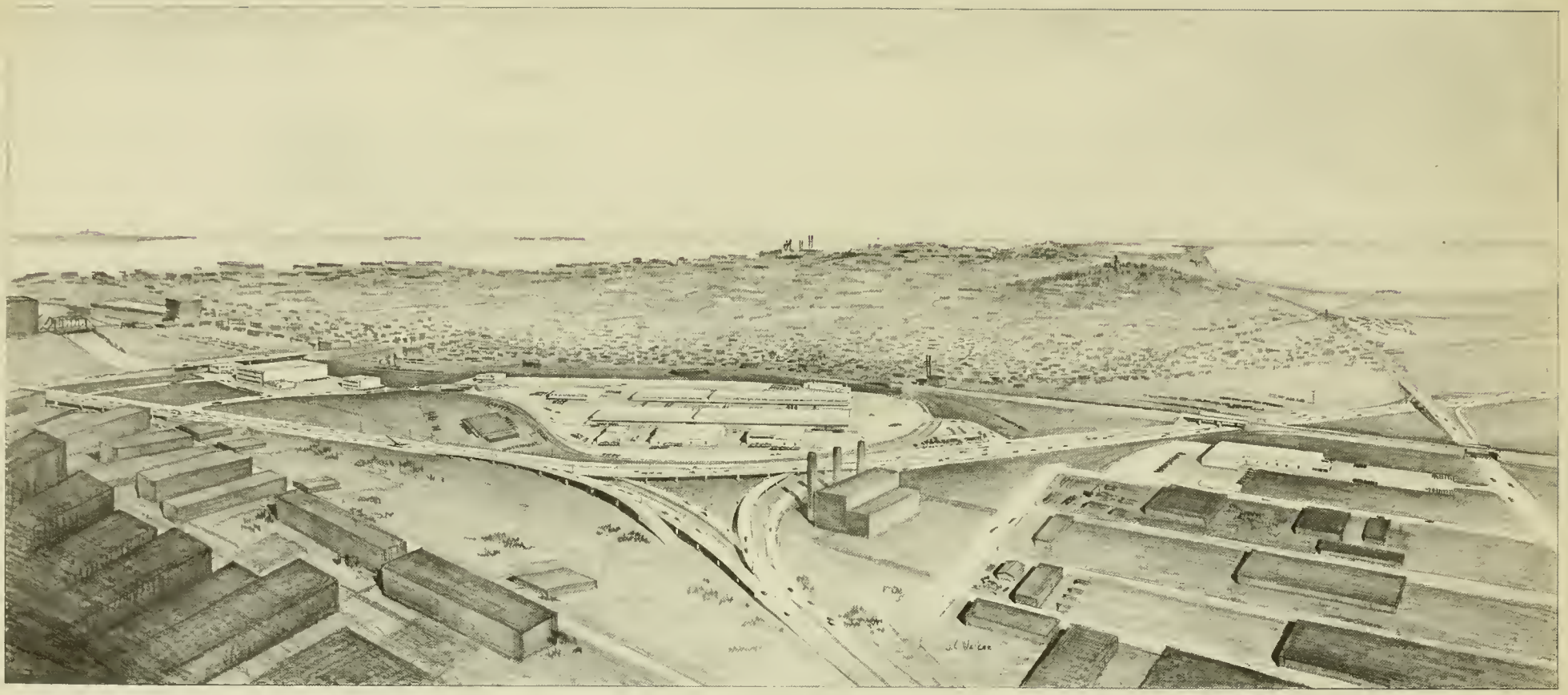
Respectfully submitted,

CHAS. T. MAIN, INC.

By C. M. Flint

C. M. Flint

CMF/mf



PROPOSED GREATER BOSTON WHOLESALE MARKET CENTER

CHAS. T. MAIN, INC.

BOSTON, MASSACHUSETTS

GREATER BOSTON WHOLESALE MARKET ASSOCIATES
Boston, Massachusetts

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BRIEF SUMMARY

On a site which was assembled from various parcels of land available in the South Boston-South Bay area, after determination of the specific individual requirements of the proposed tenants, and after soil investigations had been made to determine the necessary foundation and structural requirements, a planned arrangement of suitable buildings was made for a new wholesale meat dealers' market area.

The present report describes a market area to accommodate 40 dealers who will be displaced from the Faneuil Hall - Downtown Waterfront Urban Renewal areas of Boston, in two multiple-occupancy buildings, one duplex, and seven single-occupancy buildings which are conveniently served by both rail and/or truck carriers. In addition, separate buildings are provided for a cold storage warehouse, a boiler-engine room plant for heat and refrigeration, general administration and related services including an incinerator.

Sufficient preliminary design and layout was done to comply with use requirements, building codes, and recommendations of the Bureau of Meat Inspection of the U. S. Department of Agriculture to permit the gathering of cost estimates.

All cost estimate data used was based on a large volume of work.

SCOPE AND DESCRIPTION OF PROJECT

As a result of projected plans for the renewal and rehabilitation of the old, blighted wholesale food market area surrounding Faneuil Hall in Boston, it has become necessary to plan for provision of a suitable relocation area for a large number of wholesale meat dealers.

Through the meat dealers' own organization, the Greater Boston Wholesale Market Associates, Inc., and with the cooperation and support of the Downtown Waterfront Corporation, the Boston Redevelopment Authority, and others, a site on certain real estate owned by the New York, New Haven and Hartford Railroad Company was tentatively selected and the present engineering study was undertaken by Chas. T. Main, Inc., in cooperation with their consultants, Henschien, Everds & Crombie of Chicago, for the purpose of establishing the general layout of the new area, a cost estimate of the entire construction project, and a feasible staging program. The results of the present study will determine the feasibility of the project relative to the tentatively selected site.

In order to establish the criteria on which the design could be based, the particular requirements of the prospective occupants were

determined by personal interviews, and the suitability of the site, together with the limitations imposed by it, was determined by on-site studies. During the progress of the present study, it was evident that the original parcels of land were inadequate in size and imposed limitations due to the presence and particular location of the railroad tracks, and the construction of a culvert to contain a creek which cuts through the land area. We understand that an additional parcel of land can be made available, and this parcel has been included in the present study.

As a result of the studies and desires of the dealers, it was determined that the most practical and economical arrangement would consist of a combination of single and multiple-occupancy buildings, one general office building, and two service buildings. The buildings are designed to accommodate trucks, and, where required, rail cars.

The arrangement allows for an adequate flow of vehicular and rail traffic, and provides an adequate amount of parking space, within the site boundaries.

The single occupancy buildings are considered in terms of the specifications desired by the intended occupants, and the multiple-occupancy buildings are planned for adaptability to the needs of the three general types of dealers who may soon or in the future occupy them: wholesalers, purveyors, and processors.

The entire concept and planning was undertaken with the intent of providing a modern, efficient market, with potential for flexibility and adaptation to future developments and changes, as well as expansion.

The entire study is premised upon the use of simple, modern, inexpensive construction materials, but compatible with use requirements, City of Boston Building Codes, State regulations and standards set by the U. S. Department of Agriculture.

DEALER SURVEY

In order to establish the amount and types of space required to accommodate the dealers who were designated for displacement by the Urban Renewal Program, a series of personal interviews with these dealers was undertaken.

A total of 46 dealers were interviewed, and information was compiled as to their type of business and space requirements.

This information was then tabulated and from this an overall feasible layout was arrived at. This information was further used to arrive at the individual as well as multiple unit layouts.

The largest requirement for space was requested by Quincy Market Cold Storage Company, consisting of a building containing approximately 114,000 square feet in a three-story building, and a minimum of 4 acres of land.

Several of the dealers had specific requirements or requests regarding the location of their allocated space within the market.

Subsequent to the original information gathered, a number of changes were made in space to be allocated, depending on quantity of product handled, type of business, and space available for construction.

The final allocation of space which was used in the present study is as shown on Drawing 2527-1-R12 in the Appendix.

The dealer survey also indicates the need for a general administration building along with a common incinerator.

The dealer survey provided additional information on rail, automobile and truck requirements.

SITE DESCRIPTION

The site is shown in Drawing 2527-1-R12 in the Appendix. It consists of three sections of land separated by the Southeast Expressway and by railroad loop tracks. The site is located in the South Boston - South Bay area. The largest section, which shall be called Section #1, is located east of the expressway, bordering the inbound lane. One smaller Section #2 borders the outbound lane and the second smaller Section #3 is north of the main site, bordering the inbound lane of the expressway. The site has the advantages of being close to both the Downtown Boston area and the "Newmarket" area which was developed for wholesale meat dealers several years ago, as well as close access to the North and Southeast Expressways, the Mass. Turnpike (west), and the proposed Southwest Expressway.

Section #1 has access from Southampton Street by means of a one-way service road and a 60 foot right-of-way from the service road to the section. It has egress to the northbound lanes of the Southeast Expressway by means of the same right-of-way and service road, joining the expressway just south of the Northampton Street exit. Access to the southbound lanes would be by means of a turn-around at the Dover Street exit, about a mile inbound from the site.

Section #2 has no direct access to the expressways and is essentially a part of the "Newmarket" area, which lies just across Southampton Street. Section #3 has two access roads to the service road which parallels the inbound lane of the expressway.

The main lines of the New York, New Haven, and Hartford Railroad run adjacent to Section #1, and the area can be served by spurs brought into the site. This section is completely encircled by a double loop track which serves the railroad's car-washing facilities. These loop tracks must be kept clear at all times. The spurs which are brought in must enter the area parallel to the entering loop tracks.

Section #2 cannot be served by rail because of grade limitations in that area. Section #3 can be served by a spur off the loop track, coming across the new culvert.

The total land area involved in the combined sections is approximately 1,981,000 square feet.

In addition to land used and described above, it is our understanding that there is another small section of non-rail land of approximately 76,000 square feet which can be made available in the immediate vicinity which could be used for expansion.

SOIL INVESTIGATION

In order to establish the nature and bearing characteristics of the soil, a series of 33 test borings were taken. The location of these test borings is shown on Drawing 2527-1-R1 and a tabulation of the boring logs is included in the Appendix. Five of these 33 borings were of the undisturbed type and were the basis of a report by Haley & Aldrich Consulting Engineers which appears in a separate section of this report titled "Settlement Analysis".

The borings ranged in depth from 40 to 150 feet . The materials consisted of a layer of fill composed of sand, cinders and gravel. Underlying this is a layer of organic soil, followed by a layer of stiff clay and/or compact sand over a deeper layer of soft clay.

Due to the loads to be carried and the generally poor condition of the soil, all structures have been figured to be supported on piling with a suspended type first floor slab.

Water levels presently are affected by tidal conditions and due to an unknown water level at the completion of installation of the concrete culverts now being installed by the Department of Public Works of the Commonwealth of Massachusetts treated timber piles were considered in

the cost analysis with the exception of the Quincy Market Cold Storage Warehouse. This building, due both to the heavier loading and building code requirements, will be supported on concrete filled pipe piles.

SETTLEMENT ANALYSIS

During the course of the soil investigation work, it became obvious that with the magnitude of floor area to be constructed there would be substantial saving if ground floor slabs could be supported on grade. Along this line of thinking, the firm of Haley & Aldrich Consulting Engineers, specialists in soils analysis, were contracted to take settlement tests. A copy of their report is contained in the Appendix.

SITE DEVELOPMENT

Railroads

Sections #1 and #3 will be served by the New York, New Haven and Hartford Railroad.

The following rail service will be provided:

1. A switch and single track to serve the single-occupancy building which borders the east property line.
2. A switch and single track, followed by a switch into double tracks to serve the multiple Building #1. An additional switch and crossover are also provided to give these tracks flexibility of use.
3. Switches and a crossover similar to the above fcr multiple Building #2.
4. A switch and single track along the west property line to serve the two single and one duplex buildings.
5. A switch and single track to serve the three buildings on Section #3.

Highway Access, Roads and Pavement

Section #2 (on the west side of the expressway) is an "L" shaped piece of land bordering Southampton Street and Moore Street.

Access to this section is had from both streets. The area will be paved, as shown in Drawing 2527-1-R12, allowing vehicular traffic on all paved areas.

Section #1 has a single access and egress via the one-way (northbound) existing service road which parallels the northbound lane of the Southeast Expressway. This is shown as the entrance road on Drawing 2527-1-R12, which also shows the paved areas within the site.

Section #3 has two access-egress roads both from the service road described above. These roads and the paved areas of this parcel are shown on Drawing 2527-1-R12.

A bridge joining Sections #1 and #3 has been included in the site development plan. This is necessary to facilitate traffic flow between the two parcels; without it, in order to travel from Section #3 to Section #1, a trip of 2.5 miles over congested city streets would be required.

Parking Areas

Adequate paved automobile and track parking areas are provided on each of the three sections as shown in Drawing 2527-1-R12.

Storm Drainage

Storm drainage for the site is indicated as being collected by reinforced concrete piping through catch basins about the area of buildings and paved areas and then passing into the new large culverts at points indicated on Drawing 2527-1-R13.

Sanitary Drainage

Sanitary drainage is indicated as being collected by a system of piping from the various buildings in the complex and then being conducted to a point where a sewage pumping station will pump the waste to the city sewer in Albany Street.

At the location indicated on Drawing 2527-1-R13, the pressure sewer pipe can pass under the service road which runs along the west side of the site and then pass under the elevated expressway to reach the city sewer in Albany Street.

The pumping station is required to pass the sanitary waste line over the new drainage culvert currently being built under contract to the State Department of Public Works. A standby gasoline driven generator has also been included to operate the system in case of power failure.

Process Effluent

The waste from the various processing plants will contain grease which must be prevented from entering the city sewer system. Each building will be required to have a grease interceptor unit which will require grease removal periodically.

Water Supply

Although other locations are possible for connections to city water, the location for the purpose of this report is shown on Drawing 2527-1-R13

at the Dover Street main from where it extends through the site with sectionalizing valves and hydrants.

Area Lighting

Area lighting in general will be from market buildings but will be supplemented by pole lighting where necessary.

Fire Protection

The water main through the complex will provide fire protection as well as potable water to plant use. Piping separate from the process water lines will be required for fire protection to each building.

Special Conditions

All utilities including gas, water, sewer, storm drainage, electrical requirements and driveways for the occupant of Section #2 on Southampton Street and Moore Street will require connections to city services in this area and are treated separately in the cost estimate.

GENERAL ARRANGEMENT OF STRUCTURES

The configuration of the sites, plus the inflexibility of the railroad and road accesses limited the arrangement of the structures on the sites.

Long multiple-occupancy buildings contribute to economy of construction, but detract from accommodation to good rail car placement and movement service. The area and shape of the main site dictated the placement of two long multi-occupancy buildings approximately parallel in axis to the existing main line railroad tracks.

These buildings were placed with their truck platforms facing each other across a 200 foot wide center pavement. This is ample area for the maneuvering of maximum length trailers, plus a single row of customer parking down the middle.

A small parcel of Section #1 adjacent to the 60 foot right-of-way into the property lent itself to use for the general office building, and with the placement of the multiple buildings having been established, the individual dealers' buildings were then located on the site dependent on their square footage requirements and available land areas.

This arrangement complies with the possible arrangement of rail spurs which was allowed by the New York, New Haven and Hartford

Railroad, and with the permissible use of the reinforced areas of the culvert for carrying rail cars. It represents a good utilization of the area available for construction.

Both rail and truck access to the buildings is convenient. Rails hug the perimeters of the site, except where they make short crossings of paved areas to reach the rear platforms of the multiple-occupancy buildings.

The entrance road leads directly to the wide street between the two main buildings, and there is sufficient space for two-way truck traffic in all areas.

The "L" shaped Section #2 plus the square footage requirement and the fact that rail service was not required dictated the locating of P.W. Rounsevell Co. at the location shown.

The space requirements requested by the Quincy Market Cold Storage Warehouse facility could best be satisfied on Section #3, with space for two additional single-occupancy buildings.

DESCRIPTION OF STRUCTURES

The market is planned as a complex consisting of two main, multi-occupancy buildings, nine individual operators' buildings, an office building and two service buildings.

The multi-occupancy buildings are 720 feet and 675 feet in length. Both buildings are 132 feet deep, each with a 20 foot wide continuous truck dock and a 12 foot wide continuous rail dock, leaving a 100 foot enclosed building shell. Bay multiples are 25 feet wide in the 720 foot building and 30 feet wide in the 675 foot building, in order to give the spaces flexibility and adaptability. Based upon these two modules, a variety of occupancy units is available. Space is provided in these multiple units for 31 dealers as shown in Drawing 2527-1-R12.

These two buildings will have a main floor with 12 foot ceiling height, and a second floor with eight foot ceiling height. All fresh meat handling operations will take place on the first floor; the second floor is designed as bare space, to be utilized by the occupant for office, storage, or other non-meat handling use. Access stairs to the second floor are provided in each occupancy unit.

Multiple buildings will conform to Boston Building Code Type IV construction, consisting of non-fireproofed structural steel and masonry

(cement block), with concrete floors, supported on treated wooden piles.

Front and rear platforms are continuous for the entire length of the buildings. The 12 foot railroad platform is at a height of approximately 55 inches over the top of the rails, and the 20 foot truck platform is approximately 45 inches above the paved area. Both platforms are slightly pitched to the outside to permit good drainage. The railroad platform is roofed to a distance equal to the width of the platform. The truck platform is roofed with a 5 foot overhang to give truck loading and unloading operations protection from the weather. The truck platform forms the roof of a service tunnel which will run the length of each multiple building.

Truck platforms are figured to have continuous truck bumpers for protection. These platforms will have recessed pedestrian stairs at intervals, provided with protective rails.

Both front and rear platforms are provided with two continuous parallel meat rails with switches at each store unit.

Interior bay walls are non-bearing so that they can be removed without disturbing the structure to allow for occupancy of more than one bay.

The first floor level is constructed of dense, waterproof, acid-resistant concrete, with a skid resistant finish pitched to drains and

are designed for a 250 pound per square foot live load. Second floor levels are designed for 125 pounds per square foot live load and of sufficient strength to support meat rails which are suspended from it.

First floor walls are to be of either concrete block or insulated panels with an approved non-toxic waterproof finish. First floor ceilings will be insulated panels with an approved non-toxic waterproof finish.

Doorways, stairs, and all other construction design features comply with the recommendations of the Meat Inspection Division of the U. S. Department of Agriculture.

The Quincy Market Cold Storage Warehouse will, with the exception of office and dock facilities, be constructed of prestressed, precast concrete. It will be three stories in height and be supported on pipe piling filled with concrete. The office and docking areas will be of conventional poured-in-place concrete, structural steel and masonry. It will have docking space for eight rail cars and truck dock area large enough to accommodate at least sixteen trailers as requested. There will be space for future expansion between the proposed structure and Albert Richards Co. which is connected by common docking facilities.

The individual buildings, although all meeting, in general the space needs of each individual dealer will have similar type of construction. All will be supported on wooden friction piling with a first floor of pre-

stressed precast concrete. The building shell will be structural steel, concrete and masonry. With the exception of Albert Richards Co. and Home Freezer, they will all have partial second floors with the lower roof level designed for a future second floor. The above two firms will have two full floors.

The general office and administration building will be a single-story structure supported on spread footings. We have allotted 10,000 square feet for this building on an arbitrary basis. The actual space requirements could better be determined at a later date as the center moves into the actual design and construction stage. This building has been figured with a structural steel frame with walls of masonry construction.

The cost of this building could fluctuate due to the present unknowns such as type of occupancy and finish work required, both interior and exterior.

Incinerator building is nothing more than a basic shell to enclose the incinerator with the absolute minimum of services.

The engine room - boiler house is similar to but of heavier construction than the incinerator and will be large enough to enclose whatever equipment may be purchased during the actual design stage. It is thought at this time that 6,900 square feet would be adequate. The heating and refrigeration is piped by means of a tunnel from this building to multiple

Buildings #1 and #2 and to two individual buildings and the duplex building.

ELECTRICAL SYSTEM

Primary Service

The cost of primary service to the various buildings is based on the power company supplying the main complex from a 13.8 KV underground system. Two (2) 13.8 KV circuits would be installed with adequate switching to provide two sources of power at each transformer location. The power company would provide a total of five (5) transformers to step this power down to 480Y/277 volts for distribution to each building. Three (3) of these transformers would be pad mounted and located as required to supply individual buildings. The remaining two (2) transformers would be located in vaults, one in each of the two multiple occupancy buildings. From pad mounted transformers, power at 480Y/277 volts would be distributed to individual buildings through an underground system of conduits encased in concrete.

Primary service for the one building located on Southampton Street will be supplied from an overhead 4160 volt source in the area with necessary transformers to step down to 480Y/277 volts being supplied by the power company.

Power Distribution

Each individual building will be provided with a 480Y/277 volt service metered by the power company. Dry type transformers will be provided to transform from 480 volts to 120 volts for incandescent lighting and convenience receptacles. Sufficient capacity will be provided each building to take care of refrigeration, heating and ventilating, process equipment and lighting.

Power for each of the multiple occupancy buildings will be distributed through a main disconnect switch to a meter loop run through the passageway under the front loading dock. From the meter loop, each individual occupant will be supplied with a separately metered 480Y/277 volt service entrance. Dry type transformers will be provided as required to transform from 480 to 120 volts for incandescent lighting and convenience receptacles.

Equipment Wiring

The electrical cost includes complete wiring of all process equipment, refrigeration evaporators and heating and ventilating equipment as well as control panel feeders for refrigeration engine rooms. The cost of wiring for refrigeration equipment in the engine rooms is included in the cost of equipment.

Lighting System

The lighting system will in general be by fluorescent fixtures utilizing the 277 volt system. All refrigerated areas will be provided with all weather type fluorescents. Process areas will be provided with fluorescent fixtures enclosed with plastic lenses. The 120 volt system will be available for incandescent lighting where required. Adequate lighting levels will be provided depending on area function.

HEATING AND VENTILATING

Boiler Room

Two 400 HP low pressure steam boilers will be sized for the heating loads of multiple Buildings #1 and #2 and the three adjacent buildings for tenants Nos. 2, 15, 22 and 30. Allowance will be made for future use of the unfinished second floor spaces at a temperature of 70°F.

The boilers will also provide steam for the hot water system, based on the use of a 5,000 gallon storage tank with a recovery rate of 9,500 gallons per hour heated from 40°F to 140°F. This will provide a flow of water sufficient for 24 hoses running a full flow of 10 gallons per minute each for a one hour peak, with a continuous capacity of 16 hoses.

The boilers will be heavy oil fired. Fuel will be stored in two 10,000 gallon capacity buried tanks.

Hot water, fuel oil and condensate pumps will be in the boiler room. A combustion air unit will be provided and roof mounted exhaust fans will be used for summer ventilation.

Steam supply and condensate return lines will be installed in a utility tunnel from the boiler room to Building #1 thence to Building #2 with an extension to #22.

Hot water supply and recirculating lines will be in the tunnel. Forced ventilation will serve the tunnel.

Multiple Buildings #1 and #2

Steam for heating will be supplied from the boiler-engine room through the utility tunnel.

Office areas, lockers and toilets will have finned pipe convectors with simple thermostatic control, to maintain a temperature of 70°F. Toilets and locker rooms will have an exhaust system. In the second floor dry storage area a heating and ventilating unit will be located, discharging tempered air to the first floor fabrication areas to aid the roof mounted exhaust fan in the removal of moisture clouds resulting from cleaning operations. The second floor unfinished space will have a small suspended unit heater sized to maintain a temperature of 50 - 55 °F.

Individual Buildings

All individual buildings will be separately designed to meet specific requirements but all will have similar areas although the proportions of each will be different.

Office areas, lunch rooms, toilet and locker rooms will have finned convectors. The toilet and locker rooms will be force ventilated by simple exhaust systems. Dry storage areas will have suspended unit heaters.

Fabricating areas will have exhaust systems to remove the clouds formed during wash down periods.

Make-up air units, usually located in the second floor dry storage area will provide tempered air to assist in fog removal and drying. These systems can, of course, be used at other times as required.

Buildings #15,2, 22 and 30 will receive steam for heating and hot water all year from the central system. All other individual buildings will have separate boilers fired by gas or light oil.

Administration Building

Heating will be provided by either an oil fired or gas fired boiler which will serve fixed radiation and the heating coils of the air conditioning units. One air conditioning system will serve the office areas and another will serve the cafeteria. Kitchen exhaust will be provided. Separate toilet exhaust will be used.

Separate air cooled condensers will be used for the air conditioning systems.

MECHANICAL SERVICES

Mechanical services including potable water supply, water for fire protection systems, storm drainage, and sanitary drainage will be extended to each building from the mains indicated under the site development section.

An approximation of the overall cost of these services for each building has been made by making general assumptions regarding the kind and quantities of installed fixtures.

The plumbing costs for the multiple occupancy buildings assume the requirements for a typical bay for toilet fixtures, floor drains, hot water usage, etc. and multiply this by the number of tenants. The water heating unit and grease removal unit for the building are included as part of the overall cost of the building.

The plumbing costs for buildings of individual ownership are made by assumed fixture installation with allowance for greater requirements in processes where large usage of water requires larger heating units and larger drainage facilities.

Fire protection is indicated as wet or dry sprinkler systems over the areas in buildings used as office space, dry storage and shipping rooms. For the multiple occupancy buildings this is taken as the whole top floor.

REFRIGERATION

Refrigeration will be by an ammonia system.

Direct expansion evaporators will be used in coolers and liquid recirculating type evaporators will be used in freezers. In general, fan type evaporators will be used.

All compressors will be high speed multi-cylinder on 25 psi suction and rotary for booster use on freezer suction. All compressors will have electric motor drives.

Condensers will be evaporative type with fans and recirculating water spray. Water used will be for make-up only.

All refrigeration equipment will have automatic control and will not require any operators except for occasional checking and maintenance.

Suction traps and other safeguards for equipment will be provided.

Multiple Buildings #1 and #2 and the group No. 15 Lampert to No. 30 Blinder will be served by one central engine room which will contain 25 psi compressors, condensers, traps, etc. Freezer suction to these areas will be taken care of by traps and boosters in rooms in each general building group. Liquid from freezer suction traps will be used to supply liquid recirculating type evaporators.

All individual buildings not served by the central engine room will each have their own engine room with refrigeration details similar to those already given.

EQUIPMENT

The only process equipment included will be the provision of meat rails for all occupancy units.

STAGING PLAN

In order to expedite the progress of the renewal plans for the Downtown Waterfront project area, it is necessary that four of the intended dealer occupants be moved from their present locations in the old market area prior to the estimated completion date for the entire market center.

There are two alternatives for the solution of this problem. If these four dealers can agree to occupy one end of a multiple building, construction can be scheduled to have this one building available for functional occupancy six to ten months prior to completion of the entire project. Certain inconveniences and interferences to these dealers would result from this early occupancy, but they would be able to function reasonably well.

The second alternative would be provision of suitable temporary rental quarters in another area for these dealers. Search for these temporary quarters would begin at once.

The second alternative would be preferable, since it would assure early removal of the dealers concerned from their existing premises.

Added expenses involved in either of these alternatives is not included in our cost estimates.

ITEMIZED COST ESTIMATE

ITEMS COMMON TO ENTIRE CENTER

Site Development

Fill and Grading	$ 466,600
Bridge	280,000
Paving	311,000
Railroad Tracks	148,000
Water Mains	77,500
Storm Drainage	73,500
Sanitary Mains & Pumping Station	74,000
Primary Electric	60,000
Area Lighting	35,000

Administration Building

Structure	105,000
Electrical Service	40,000
Mechanical Service	10,500
Heating and Ventilating	55,000

Incinerator

Structure	10,000
Electrical Service	2,500
Mechanical Service	5,400
Equipment	60,000
	$1,814,000

ITEMIZED COST ESTIMATE

ITEMS PERTAINING TO INDIVIDUAL BUILDINGS OR AREAS

Boiler and Engine Room including Tunnel

Piling	$ 16,000
Structure	121,000
Electrical	78,000
Mechanical	4,500
Refrigeration	743,000
Heating and Ventilating	179,500
	$ 1,142,000

Multiple Building #1

Piling	$ 236,000
Structure (including insulation)	1,563,000
Electrical Service	280,000
Mechanical Service	146,700
Fire Protection	39,900
Heating and Ventilating	90,000
Refrigeration Equipment	(see Boiler & Engine room)
Meat Rails	119,000
	$ 2,474,600

Multiple Building #2

Piling	$ 254,700
Structure	1,624,000
Electrical Service	289,000
Mechanical Service	151,500
Fire Protection	41,300
Heating & Ventilating	93,000
Refrigeration Equipment	(see Boiler & Engine room)
Meat Rails	123,000
	$ 2,576,500

Quincy Market Cold Storage

Piling	$ 371,000
Structure	1,090,000
Electrical Service	265,000
Mechanical Service	22,500
Fire Protection	2,700
Heating and Ventilating	24,000
Refrigeration Equipment	441,000
Elevators	80,000
	$ 2,296,200

Albert Richards Co.

Piling	$ 32,600
Structure	208,800
Electrical Service	60,000
Mechanical Service	24,300
Fire Protection	4,500
Heating & Ventilating	34,500
Refrigeration Equipment	114,000
Meat Rails	26,200
	$ 504,900

Home Freezer Co.

Piling	$ 25,700
Structure	155,000
Electrical Service	35,000
Mechanical Service	21,600
Fire Protection	2,700
Heating & Ventilating	16,000
Refrigeration Equipment	66,000
Elevator	21,000
	$ 343,000

Rounsevell Co.

Paving	$ 27,000
Piling	78,400
Structure	394,000

Rounsevell Co. (cont'd)

Electrical Service	$ 120,000
Water Main	3,000
Mechanical Service	65,800
Sanitary Main	4,500
Storm Drainage	10,800
Heating & Ventilating	50,000
Fire Protection	14,400
Refrigeration Equipment	118,000
Meat Rails	6,000
	$ 891,900

State Beef Co.

Piling	24,600
Structure	144,500
Electrical Service	25,000
Mechanical Service	13,500
Fire Protection	5,000
Heating & Ventilating	16,000
Refrigeration Equipment	41,400
Meat Rails	6,500
	$ 276,500

Omaha Packing

Piling	$ 66,000
Structure	353,000
Electrical Service	96,000
Mechanical Service	39,600
Fire Protection	5,400
Heating & Ventilating	33,000
Refrigeration Equipment	133,000
Meat Rails & Elevator	39,000
	$ 765,000

Bolton-Smart Co.

Piling	$ 41,800
Structure	278,000
Electrical Service	46,000
Mechanical Service	69,100
Fire Protection	11,700
Heating & Ventilating	12,000
Refrigeration Equipment	(see Boiler & Engine room)
Meat Rails & Elevator	20,000
	$ 478,600

Blinder

Piling	$ 38,900
Structure	232,000
Electrical Service	40,000
Mechanical Service	27,400
Fire Protection	5,500
Heating & Ventilating	11,000
Refrigeration Equipment	(see Boiler & Engine room)
Meat Rails	12,000
	$ 366,800

Lampert-Agar

Piling	$ 35,100
Structure	207,400
Electrical Service	36,000
Mechanical Service	23,400
Fire Protection	6,000
Heating & Ventilating	24,000
Refrigeration Equipment	(see Boiler & Engine room)
Meat Rails	7,600
	$ 339,500

COST ESTIMATE SUMMARY

Occupant	Bldg. Cost	Distribution of Common Costs	Distribution of Boiler & Engine Room Costs	Total
Multiple Bldg. 1	$2,474,600	$494,100	$481,400	$ 3,450,100
Multiple Bldg. 2	2,576,500	528,000	515,000	3,619,500
Bolton-Smart	478,600	69,400	67,000	615,000
Blinder	366,800	59,800	58,000	484,600
Lampert-Agar	339,500	44,200	43,000	426,700
Quincy Market	2,296,200	369,000	--	2,665,200
Richards Co.	504,900	56,700	--	561,600
Home Freezer	343,000	39,000	--	382,000
Rounsevell Co.	891,900	--	--	891,900
State Beef	276,500	29,900	--	306,400
Omaha Packing	765,000	101,500	--	866,500
				$14,269,500
			Contingency	1,426,900
				$15,696,400
			Engineering	835,000
				$16,531,400
			Land Cost	535,000
			Total Project Cost	$17,066,400

Note: Common costs and boiler-engine room costs were distributed on a square foot basis.

2527-1-1
2532-1-1

COOPERATION AND CONSULTATION WITH OTHER AGENCIES

During the course of the accomplishment of the present study, the staff of Chas. T. Main, Inc. worked with the constant cooperation of our consultants on this project, Henschien, Everds and Crombie, of Chicago, and with our clients, the Greater Boston Wholesale Market Associates and the Downtown Waterfront Corporation.

In addition, we had frequent guidance and assistance from the U. S. Department of Agriculture, particularly from Mr. William C. Crow and Mr. Earl G. Taylor of the Marketing Facilities Development Branch, and from Dr. Melvin J. Hatter of the Boston office of the Bureau of Meat Inspection.

The suggestions, recommendations and guidance of members of the following agencies contributed to the conclusions which we reached: various departments of the New York, New Haven & Hartford Railroad, the Metropolitan District Commission, the Building Department of the City of Boston, the Public Works Department of the City of Boston, and the Department of Public Works of the Commonwealth of Massachusetts.

ITEMS NOT INCLUDED

The following items of expense have not been included in the estimated total cost.

1. It is intended that equipment and materials will be delivered to the site as they are required. If equipment or materials arrive ahead of schedule and require special warehousing, or if they are delayed in arrival and cause cost-consuming construction delays, this cost is not accounted for.

2. Costs have been estimated on a straight-time basis. In the event the contractors are requested to work on a premium time payment basis, through no fault of their own, this cost will be extra to the estimate.

3. Attempt will be made to receive firm bids on all items to be purchased. This is not always possible. In the event some materials or equipment may be subject to price increases at the time of shipment, this cost will be additional to the estimate.

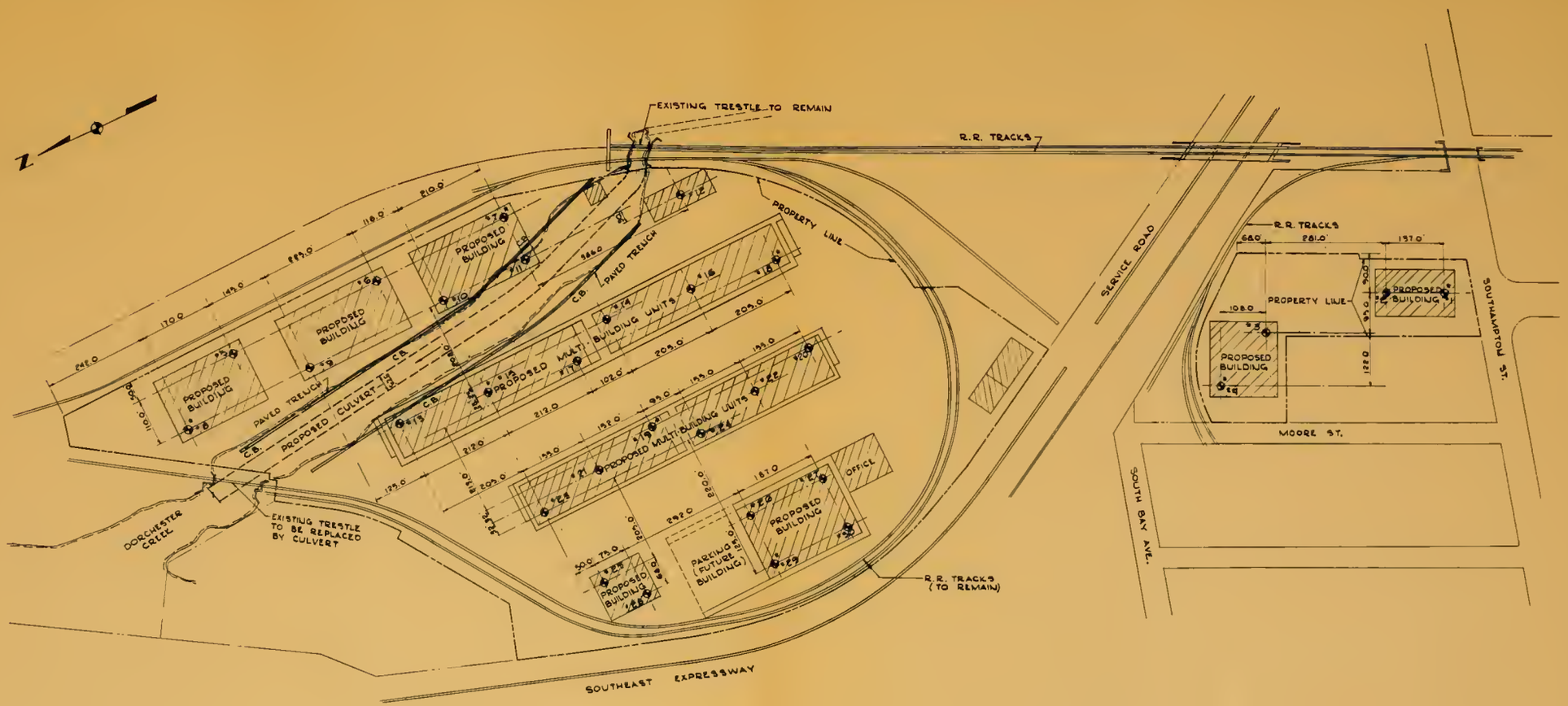
4. The costs of salaries of clients' employees, costs of this report, legal counsel, taxes, any easements and insurance are not included in the estimate.

5. The costs of temporary power, light, heat, water, etc. during construction are not included.

6. A general maintenance area, although not included, is considered to have merit for a center of this size.

APPENDIX

2527-1-1
2532-1-1



NOTES:

1 ALL BORINGS ARE TO BE TAKEN TO A DEPTH OF 400', UNLESS NOTED OTHERWISE.
2 ALL BORINGS MARKED THUS ⊕, ARE TO BE TAKEN TO A DEPTH OF 100.0'.

1-5-68	REPORT			
11-1-67	BORING PLAN			
DATE	ISSUED FOR	No.	REVISIONS	DATE
DATE MADE 18 July 67	DRAWN RAD	CHECKED P.T.		
	IN CHARGE C.M. VELEY	APPROVED C.M. VELEY		

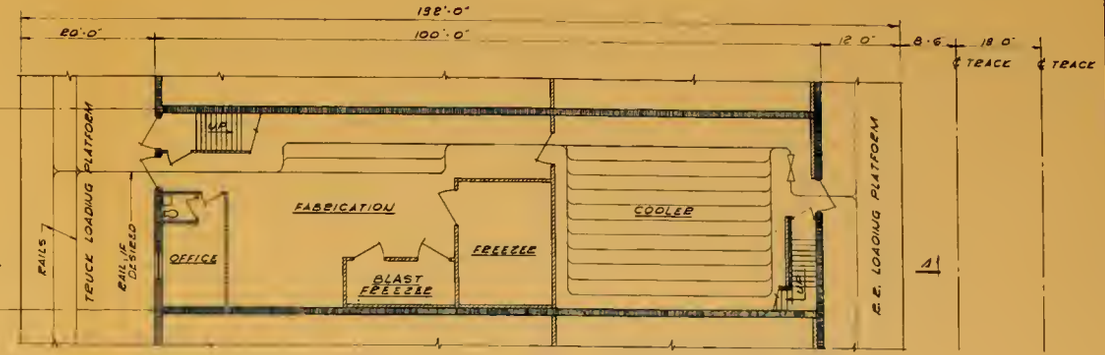
GREATER BOSTON WHOLESALE MARKET ASSOCIATION

BORING PLAN

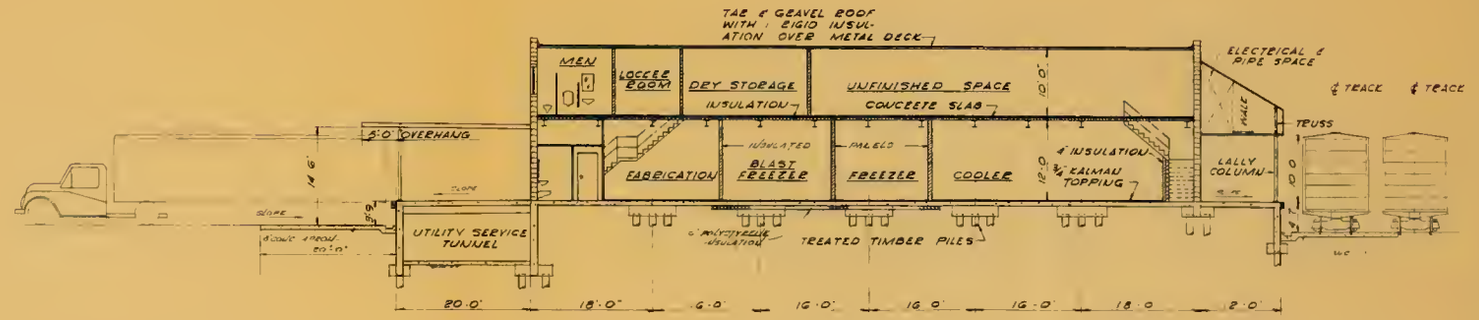
CHAS. T. MAIN, INC.
BOSTON MASSACHUSETTS · CHARLOTTE SOUTH CAROLINA

SCALE 1" = 100.0'
SUBMIT JOB DWG. NO.
2527 · 1 · R1

PLAN - SECOND FLOOR



PLAN - FIRST FLOOR



SECTION A-A

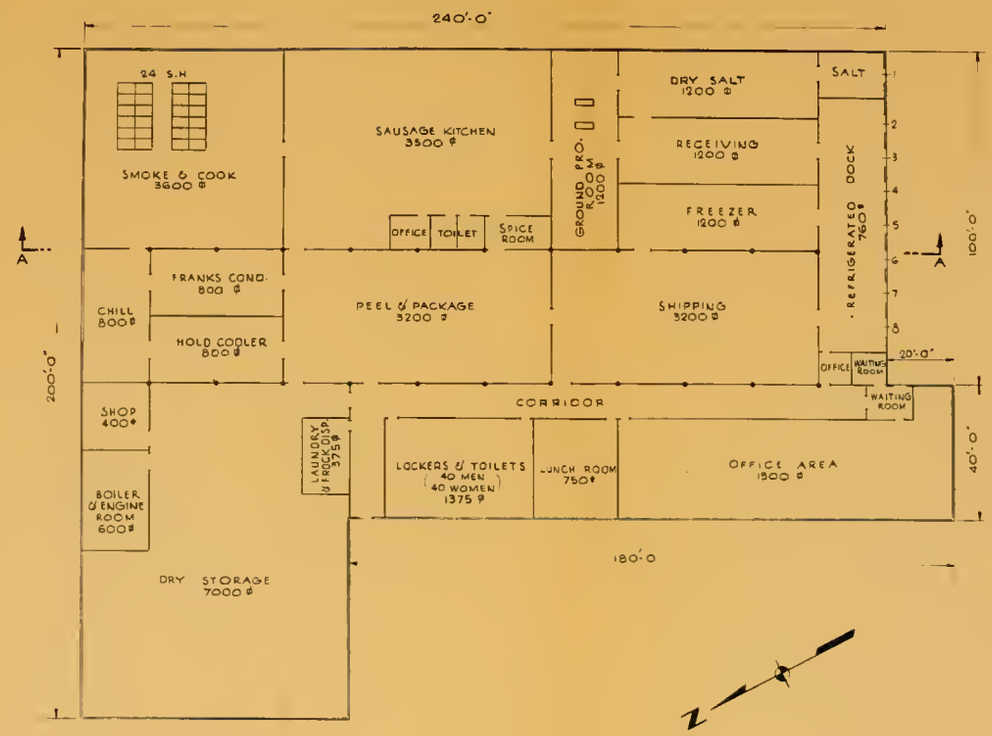
1-3-65	REPORT	NO	REVISIONS	DATE
DATE	ISSUED FOR	DRAWN RAD	CHECKED	
DATE MADE 19 NOV 64	IN CHARGE C.M. FLINT	APPROVED G.F. GROGAN		

GREATER BOSTON WHOLESALE MARKET ASSOCIATION

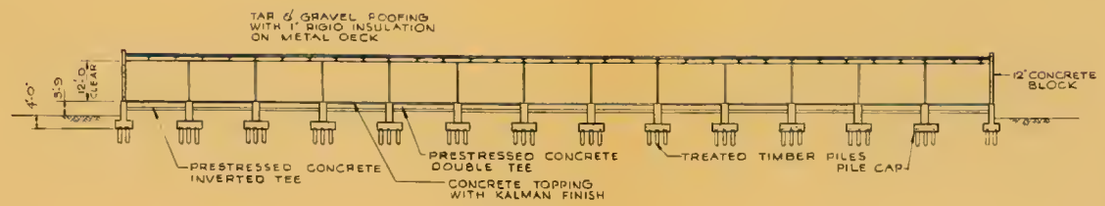
TYPICAL BAY FOR BUILDINGS A&B PLANS & SECTION

CHAS. T. MAIN, INC. BOSTON MASSACHUSETTS CHARLOTTE NORTH CAROLINA

SCALE 1/8" = 1'-0" CLIENT JOB 2527.1 BLDG. NO. R2



PLAN



SECTION A-A

NOTE :
FOR LOCATION SEE DWG. 2527-1-R2

1-3-68	Revised	No.	Revisions	Date
Date	Issued For	Drawn P Brown /	Checked	
Date Made Dec 13, '67		In Charge C.M. Flint	Approved	

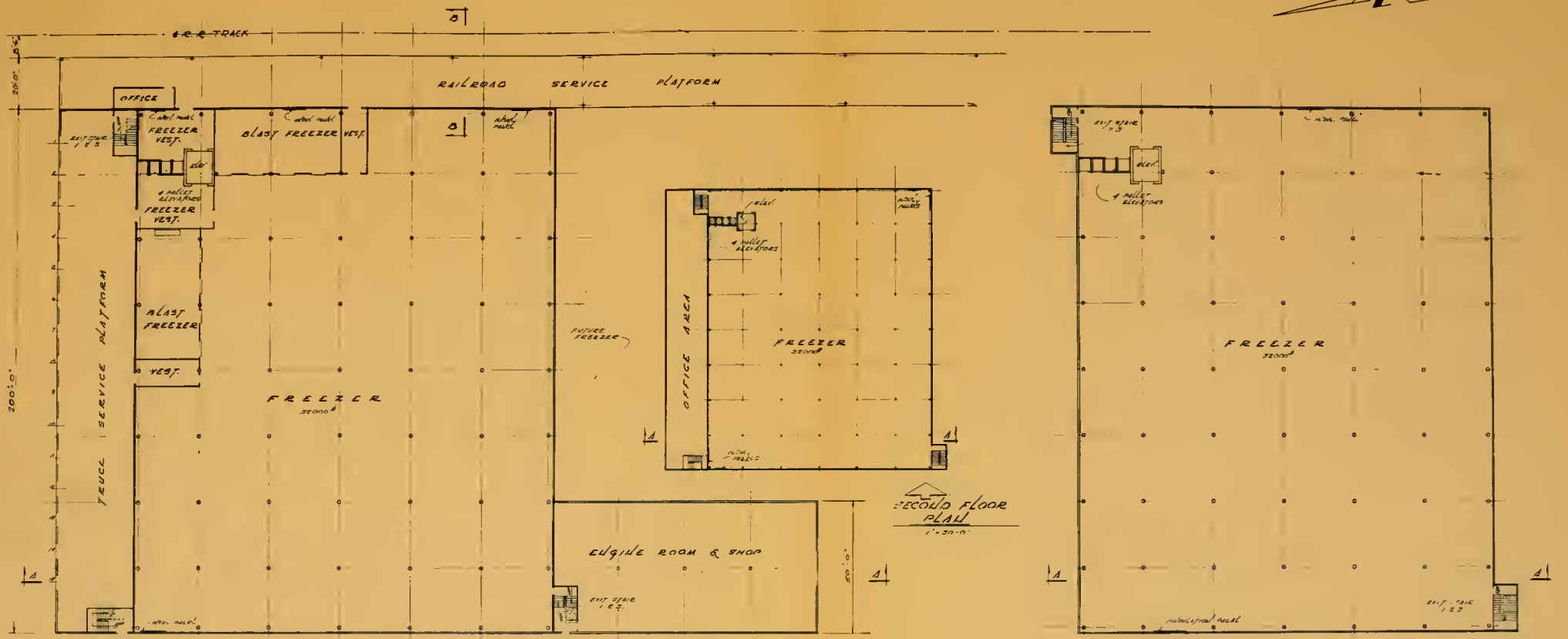
GREATER BOSTON WHOLESALE MARKET ASSOCIATION

ROUNSEVILLE
PLAN & SECTION

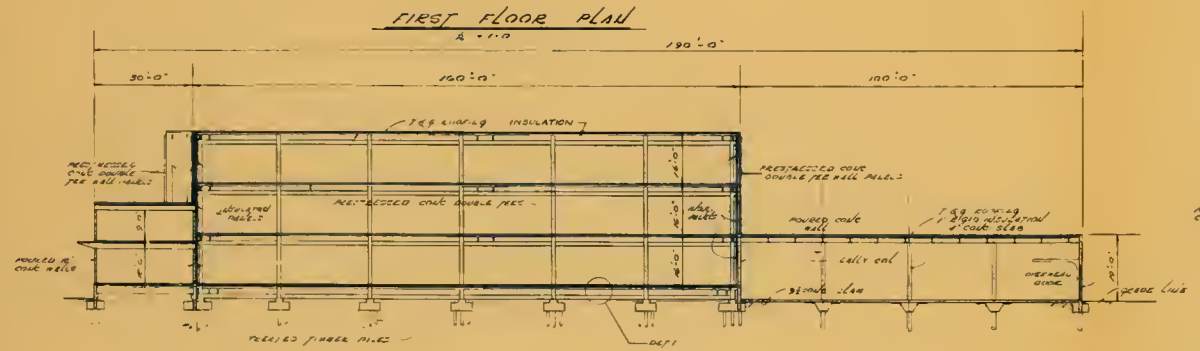
CHAS. T. MAIN INTERNATIONAL, INC.
BOSTON MASSACHUSETTS
CHARLOTTE NORTH CAROLINA

Scale: 1/8" = 1'-0"

Client	Job	Dwg. No.
	2527-1	R-3

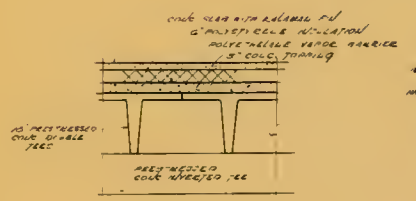


SECOND FLOOR PLAN
1" = 30'-0"



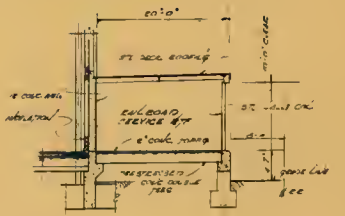
SECTION A-A
1/8" = 1'-0"

FIRST FLOOR PLAN
1/8" = 1'-0"



DETAIL 1
3/4" = 1'-0"

THIRD FLOOR PLAN
1/8" = 1'-0"



SECTION B-B
1/8" = 1'-0"

NOTE:
FOR LOCATION SEE DWG. E527-1-R2

10-3-65 REVISED DATE	REVISIONS			DATE
DATE		DRAWN D.E.	CHECKED R.T.	
DATE MADE 12-3-65		IN CHARGE C.H. FLINT	APPROVED G.F. JORDAN	

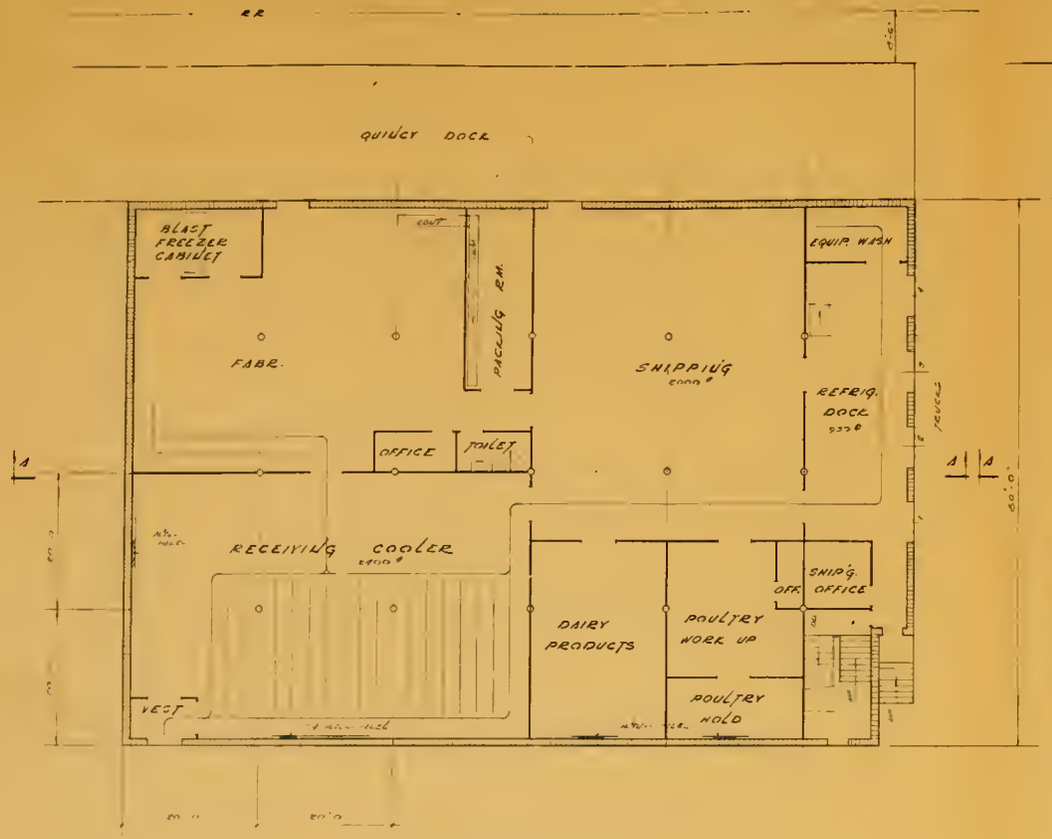
GREATER BOSTON WHOLESALE MARKET ASSOCIATION

QUINCY MARKET COLD STORAGE CO.
PLANS & SECTIONS

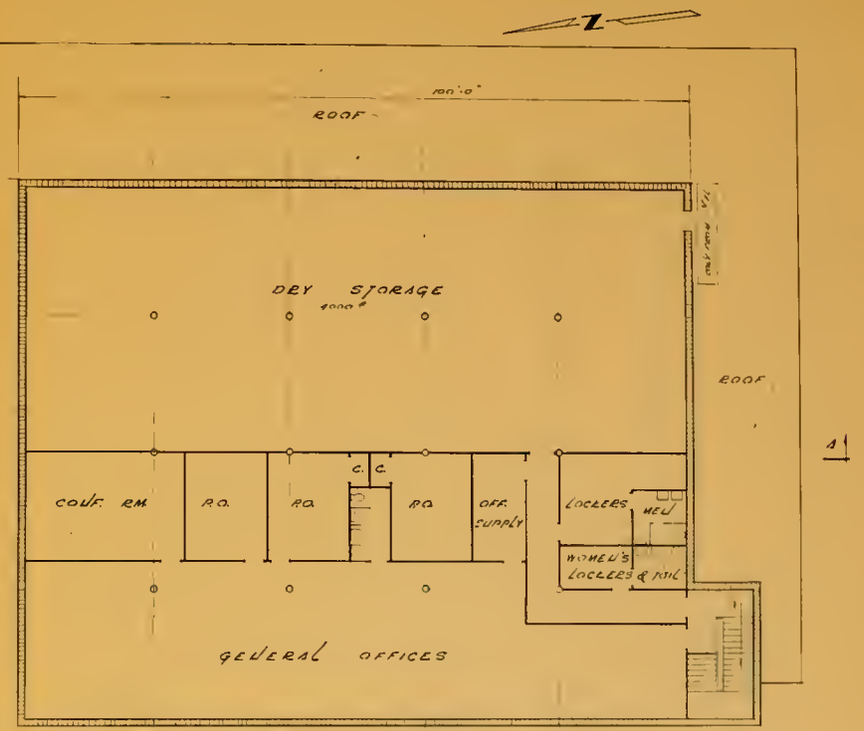
CHAS. T. MAIN, INC.
BOSTON, MASSACHUSETTS — CHARLOTTE, NORTH CAROLINA

SCALE: AS NOTED
CLIENT JOB STAT. NO.

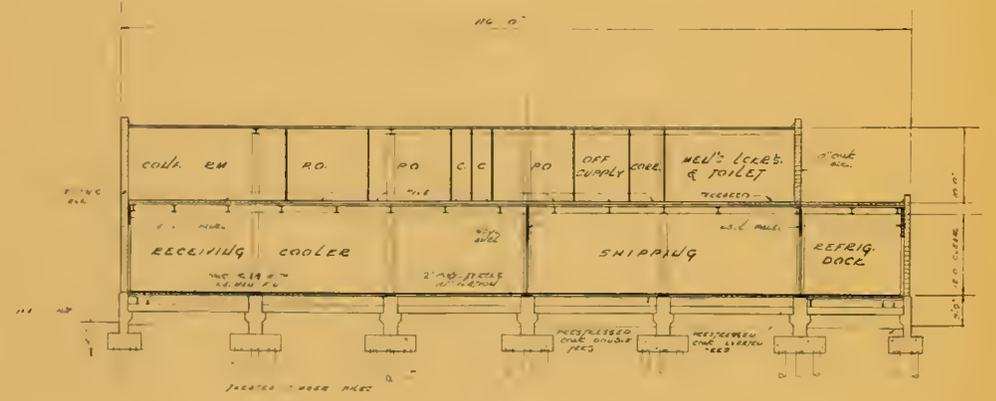
E527 - 1 - R4



FIRST FLOOR PLAN



SECOND FLOOR PLAN



SECTION A-A

NOTE:
FOR LOCATION SEE PLAN EXCEPT AS NOTED

1-3-65	REPORT	No	REVISIONS	DATE
DATE	ISSUED FOR	DRAWN	CHECKED	
DATE MADE 12-2-64		IN CHARGE C.M. FLYE	APPROVED O.T. GROGAN	

GREATER BOSTON WHOLESALE MARKET ASSOCIATION

NO. 24 RICHARDS

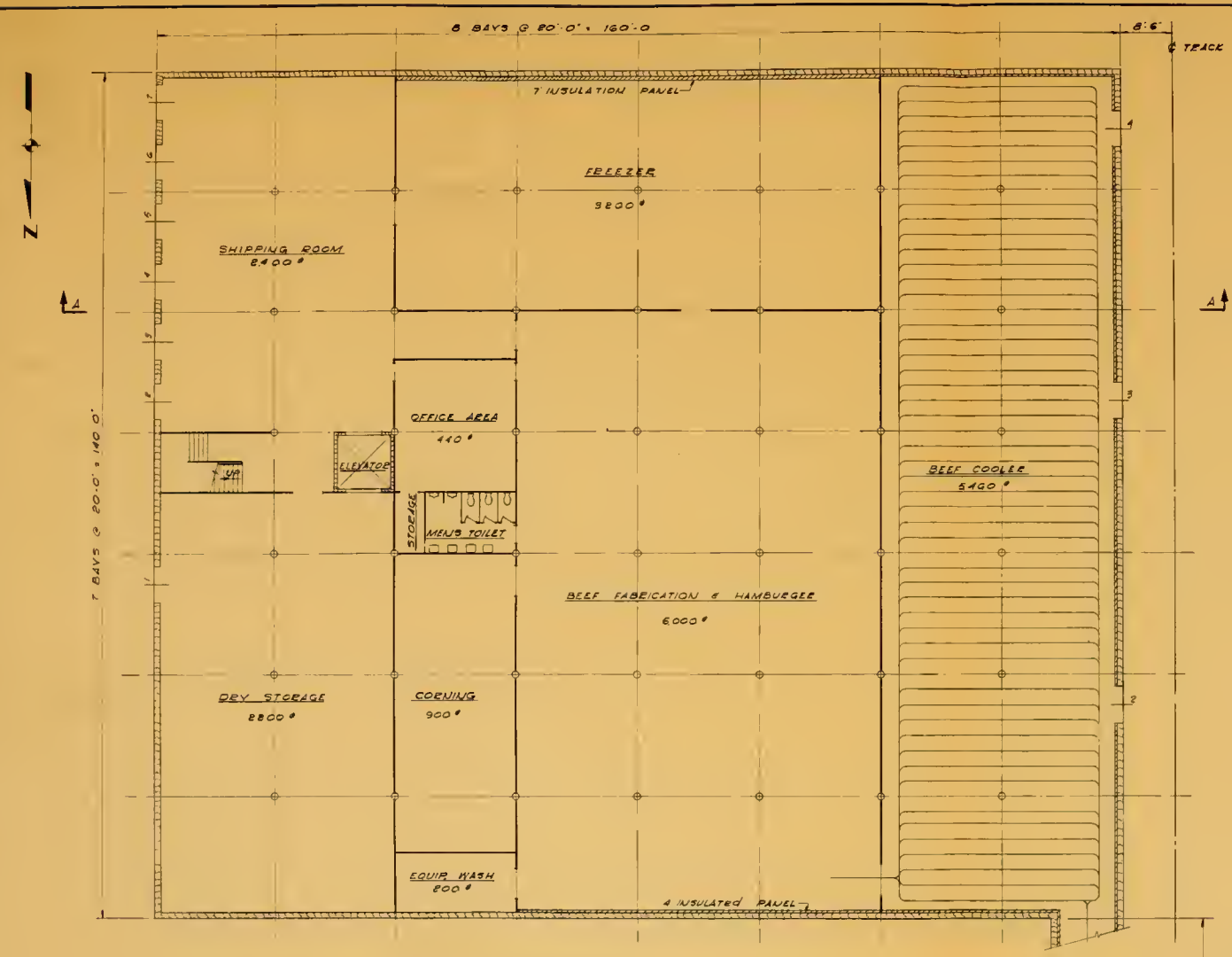
PLANS & SECTION

CHAS. T. MAIN, INC.
BOSTON, MASSACHUSETTS
CHARLOTTE, NORTH CAROLINA

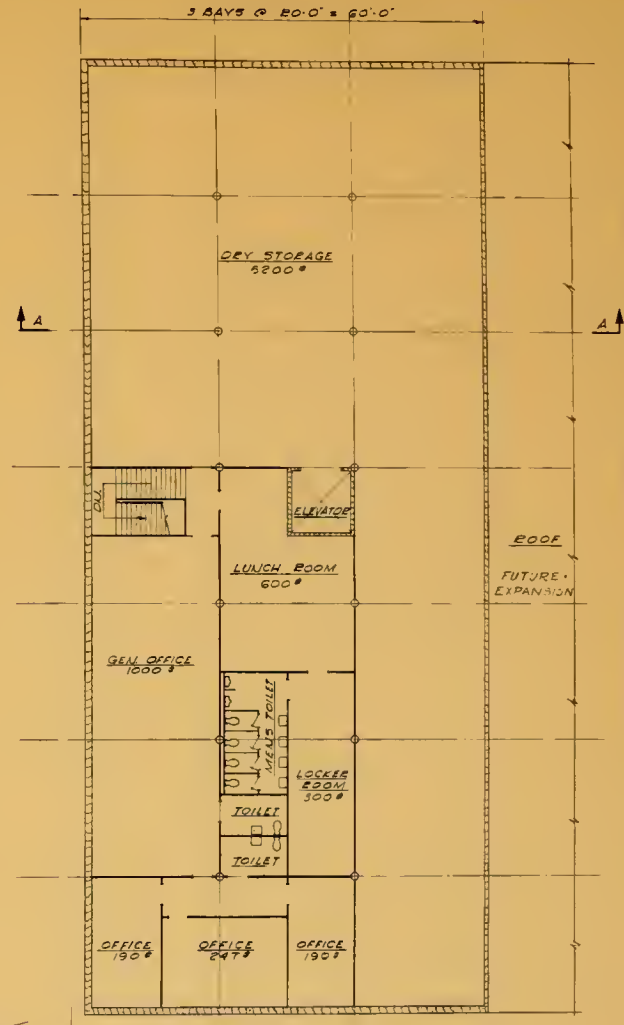
SCALE 1/4" = 1'-0"

CLIENT JOB DWG. NO.

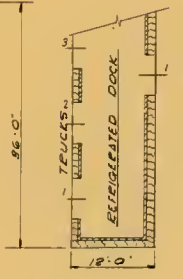
8587 - 1 - 25



PLAN - FIRST FLOOR



PLAN - SECOND FLOOR



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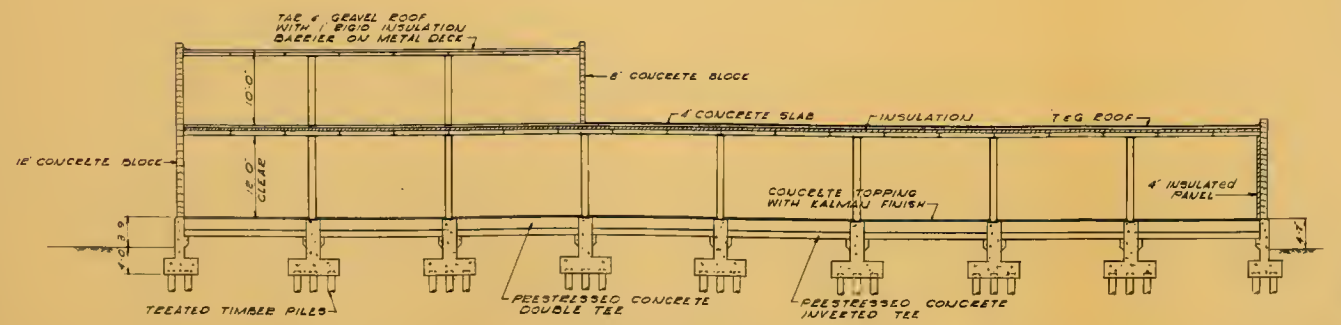
NOTE : FOR LOCATION SEE DWG. BS27-1-RE.



SECTION A-A

1-3-65	REPRINT	NO	REVISIONS	DATE	
DATE	ISSUED FOR	DRAWN RAD	CHECKED R.T.		
DATE MADE 1 DEC 64		IN CHARGE C.M FLIUT	APPROVED G.F. GEOGAU		

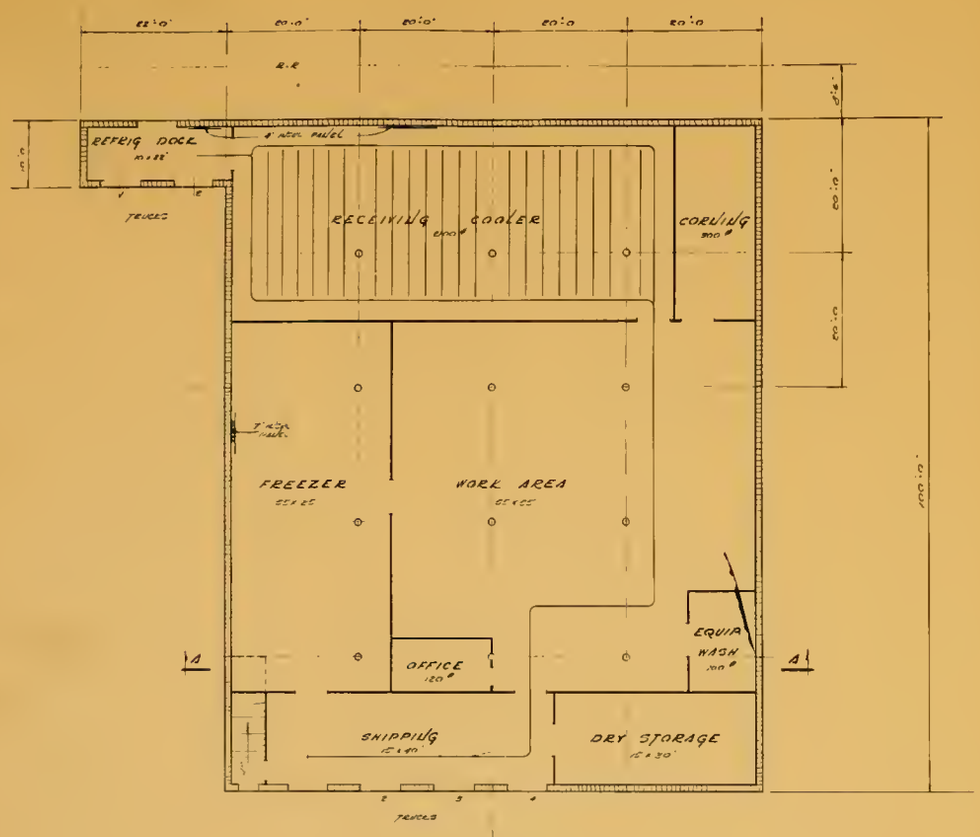
CLARENCE M. FLINT No. 3880 REGISTERED ENGINEER COMMONWEALTH OF MASSACHUSETTS

GREATER BOSTON WHOLESALE MARKET ASSOCIATION

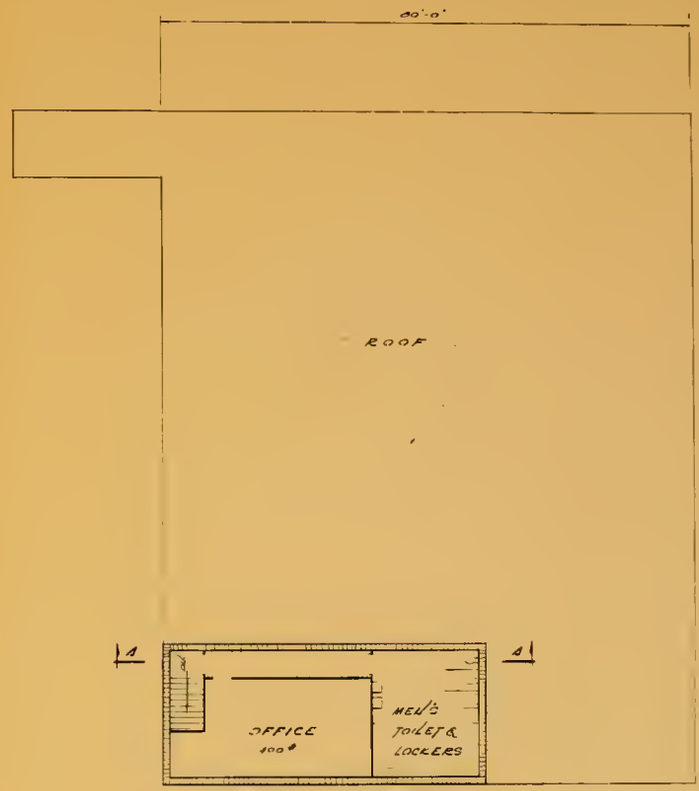
NO. 33 OMAHA
PLANS & SECTION

CHAS. T. MAIN, INC.
BOSTON, MASSACHUSETTS — CHARLOTTE, NORTH CAROLINA

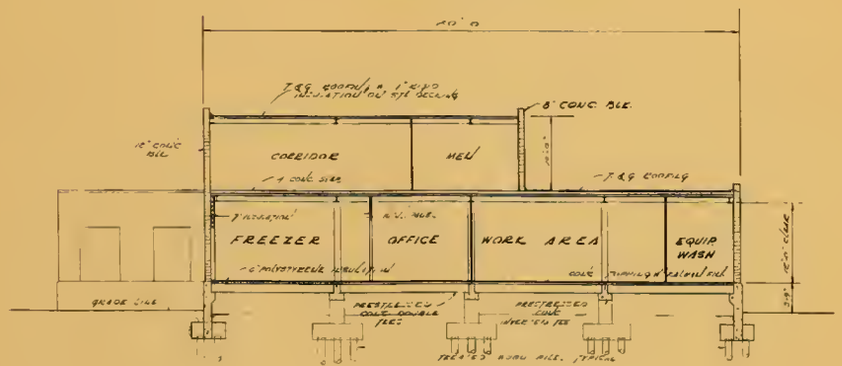
SCALE 1/8" = 1'-0"
CLIENT — JOB — DWG. NO.
2527-1-R6



FIRST FLOOR PLAN



SECOND FLOOR PLAN



SECTION A-A

NOTE: FOR LOCATION SEE DWG. 2527-1-R2

1-3-63	REPORT	No.	REVISIONS	DATE
DATE	ISSUED FOR	DRAWN D.E.	CHECKED R.T.	
DATE MADE 12-11-62		IN CHARGE C.M. Rich	APPROVED F.GRIGGS V	

GREATER BOSTON WHOLESALE MARKET ASSOCIATION

NO. 18 STATE BEEF CO. INC.

PLANS & SECTION

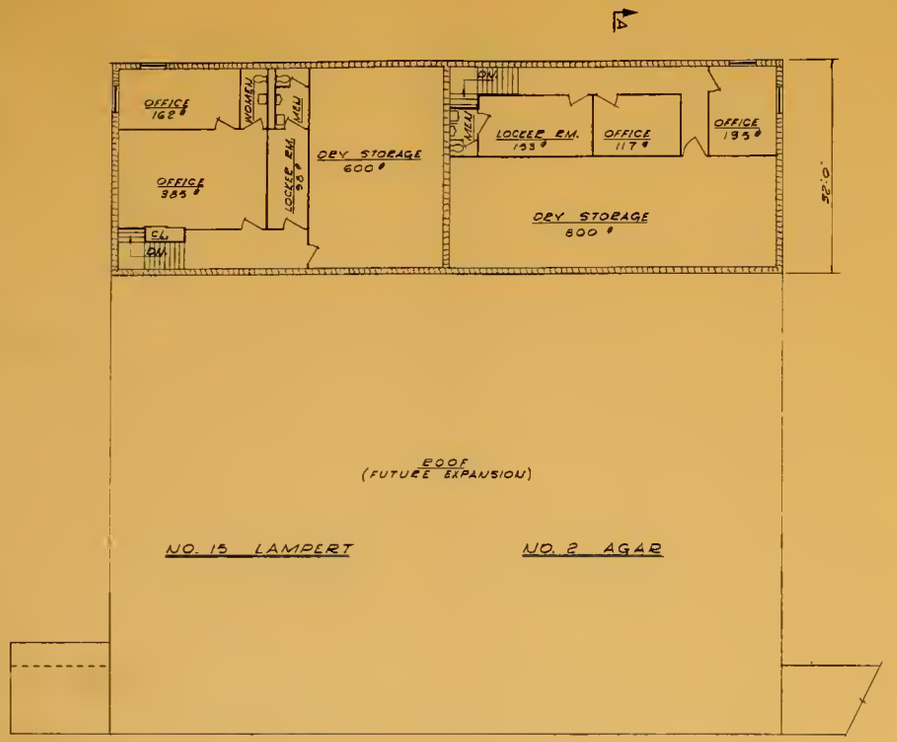
CHAS. T. MAIN, INC.

BOSTON, MASSACHUSETTS — CHARLOTTE, NORTH CAROLINA

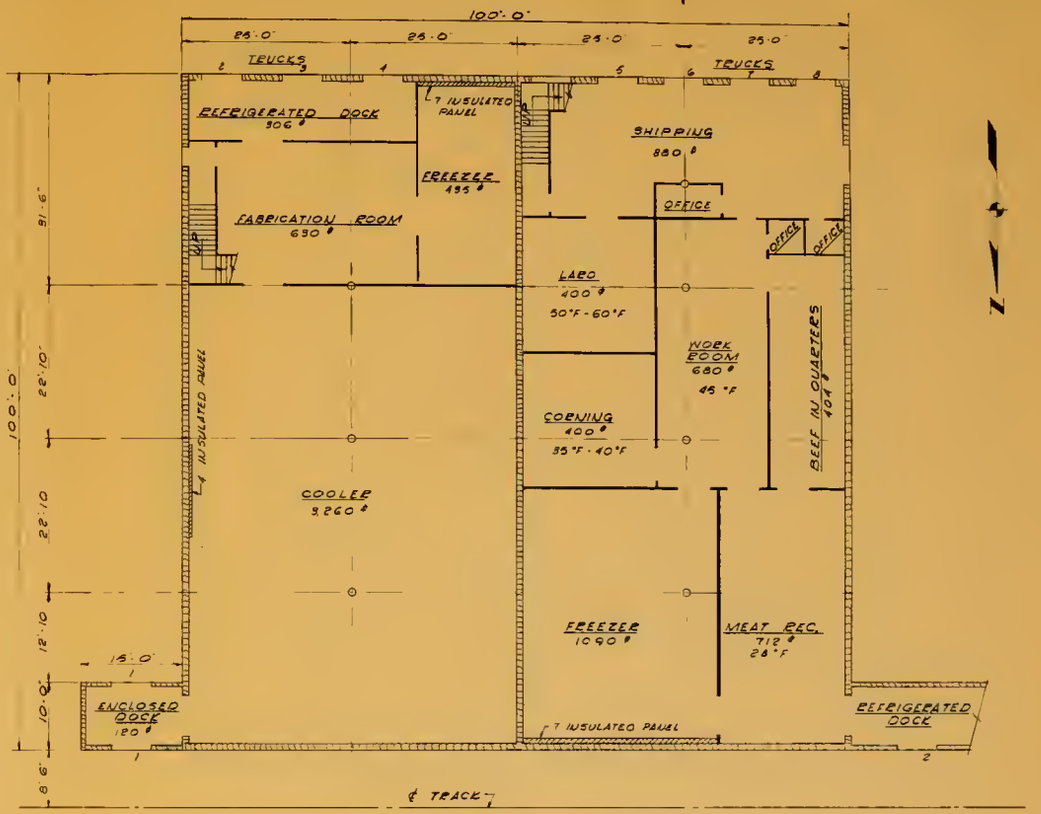
SCALE: 1/4" = 1'-0"

CLIENT — JOB — DWG. NO.

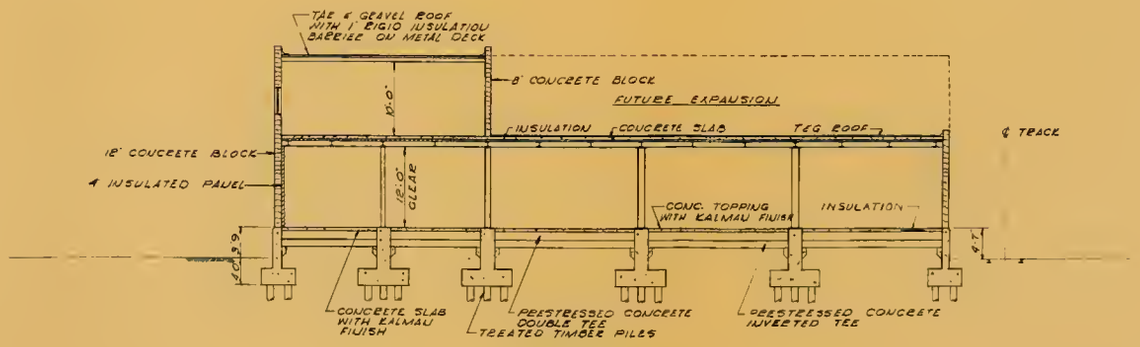
2527-1-R7



PLAN - SECOND FLOOR



PLAN - FIRST FLOOR



SECTION A-A

NOTE: FOR LOCATION SEE DWG 2527-1-22.

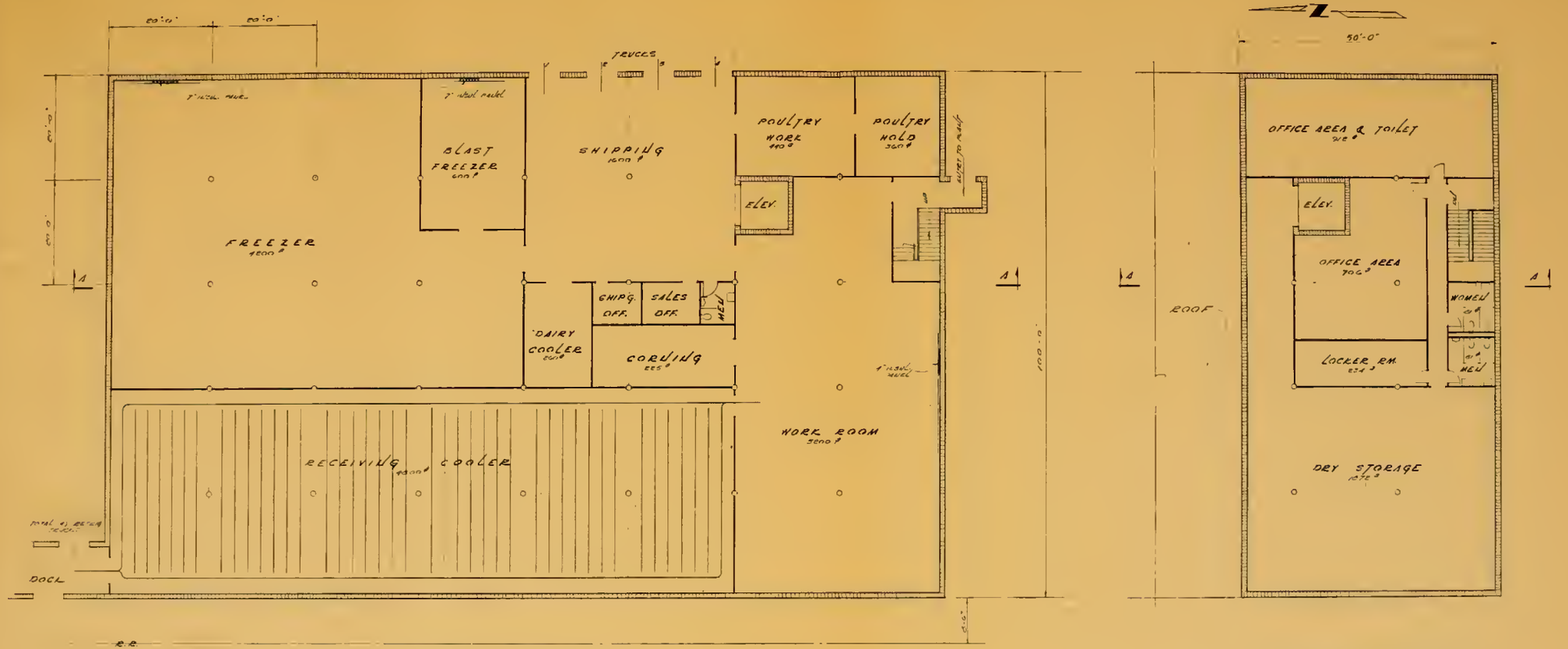
1-3-68	REPORT				
DATE	ISSUED FOR	NO.	REVISIONS	DATE	
DRAWN RAD	CHECKED F.T.				
DATE MADE 22 NOV 67	IN CHARGE C.M. FLINT	APPROVED F.F. GROGAN			

GREATER BOSTON WHOLESALE MARKET ASSOCIATION

NO. 15 LAMPERT & NO. 2 AGAR PLANS & SECTION

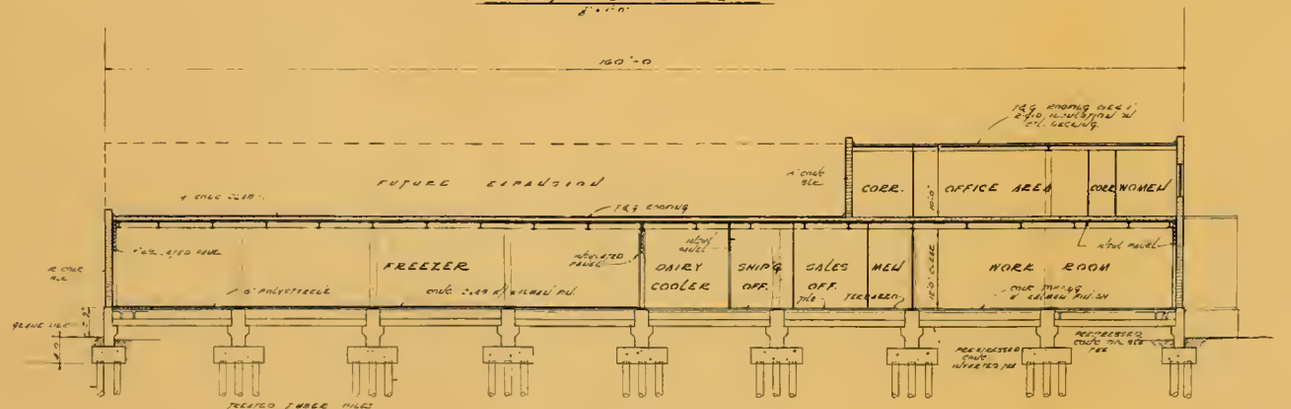
CHAS. T. MAIN, INC. BOSTON MASSACHUSETTS CHARLOTTE NORTH CAROLINA

SCALE 3/8"-0" CLIENT JOB DWG NO. 2527-1-22



FIRST FLOOR PLAN
1/8"=1'-0"

SECOND FLOOR PLAN
1/8"=1'-0"



SECTION A-A
1/8"=1'-0"

NOTE:
FOR LOCATION SEE DWG. E587-1-E8

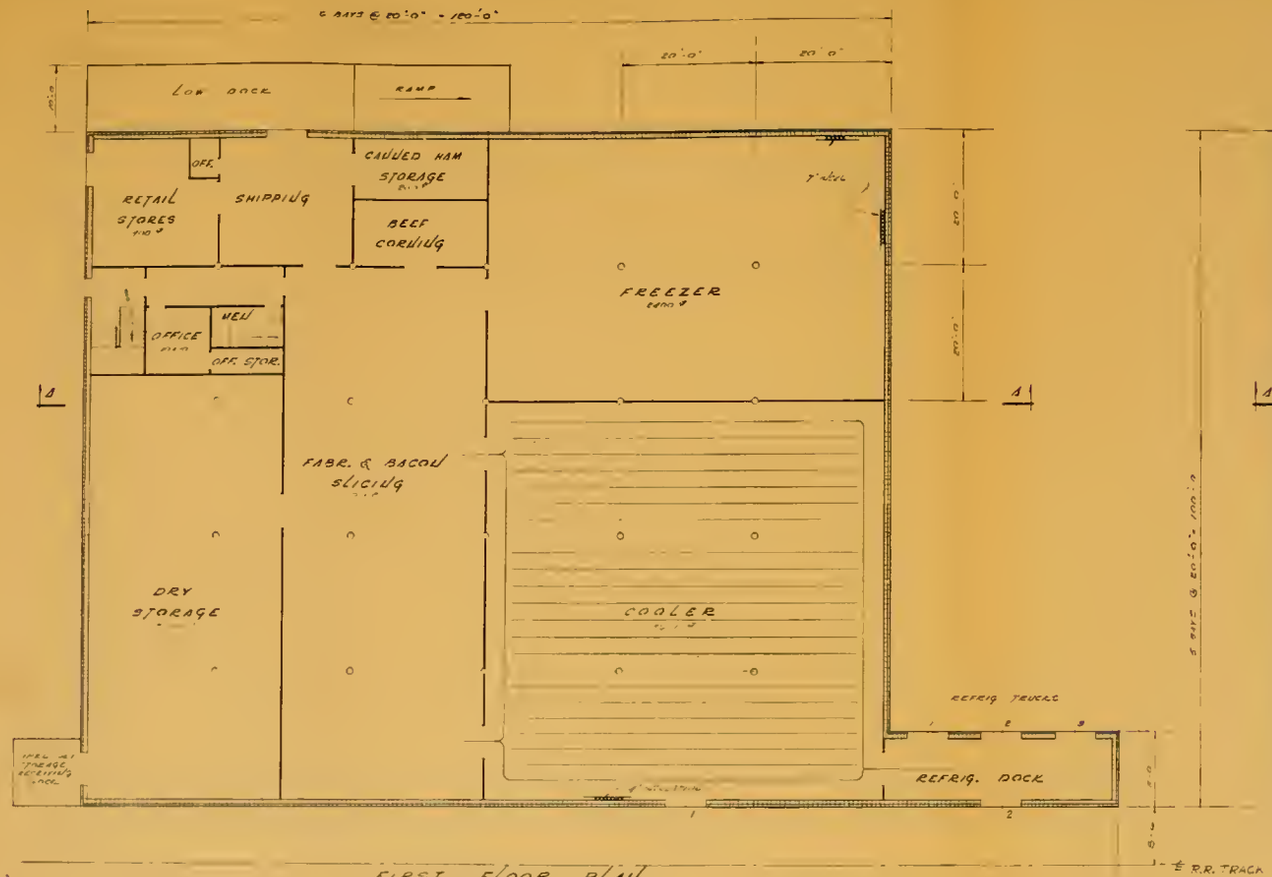
1-3-65	REPRINT	NO.	REVISIONS	DATE	
DATE	ISSUED FOR	DRAWN D.E.	CHECKED R.T.		
DATE MADE 11-30-57		IN CHARGE C.M. FYLER	APPROVED G.F.E. GOGAN		

GREATER BOSTON WHOLESALE MARKET ASSOCIATION

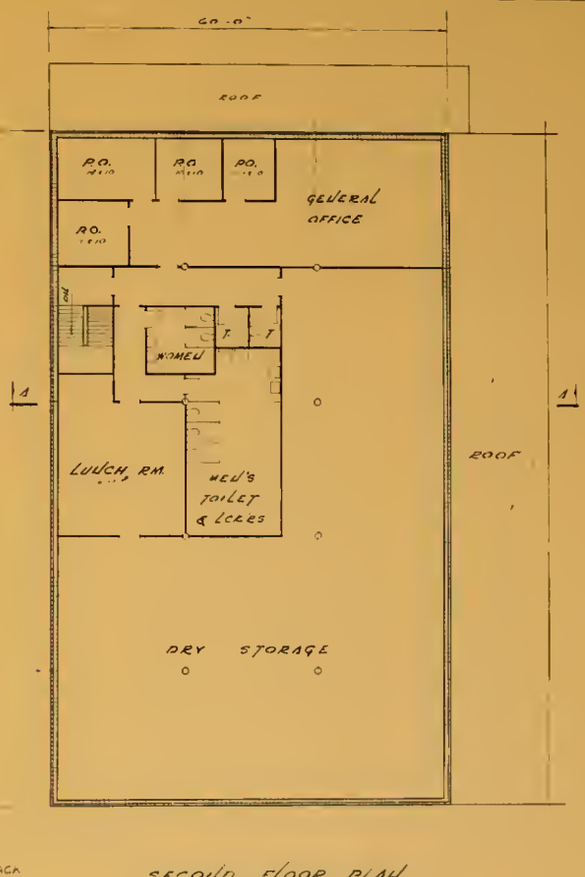
NO. 22 BOLTON SMART PLANS & SECTION

CHAS. T. MAIN, INC.
BOSTON MASSACHUSETTS
CHARLOTTE NORTH CAROLINA

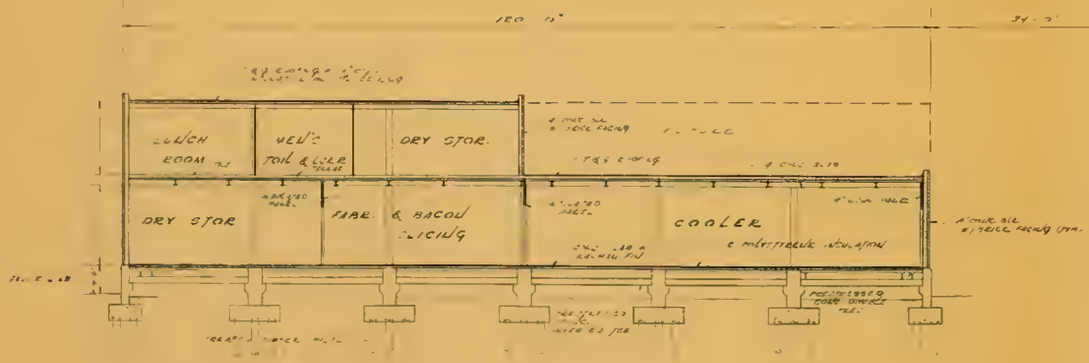
SCALE: 1/8" = 1'-0"
CLIENT JOB DWG. NO.
E587-1-E9



FIRST FLOOR PLAN



SECOND FLOOR PLAN



SECTION A-A

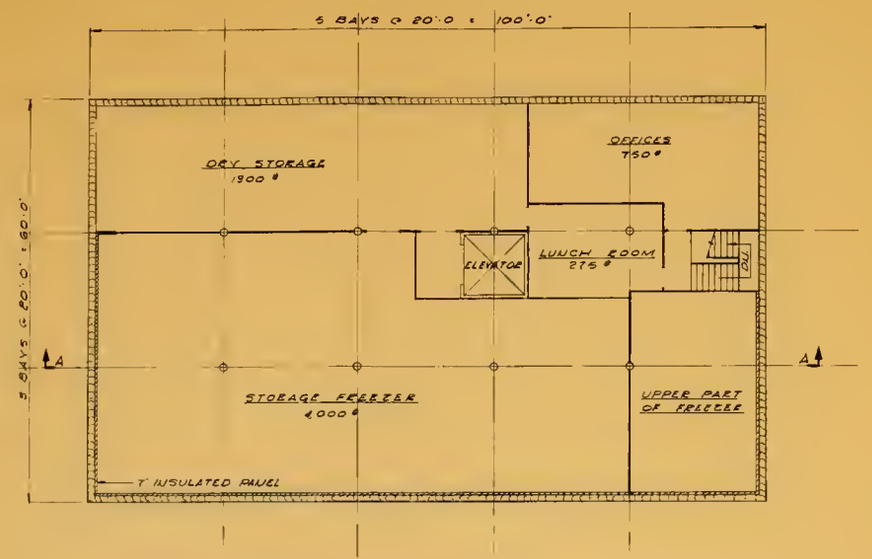
5-65	REPORT	NO	REVISIONS	DATE
DATE	ISSUED FOR	DRAWN	CHECKED	
DATE MADE		IN CHARGE	APPROVED	

GREATER BOSTON WHOLESALE MARKET ASSOCIATION

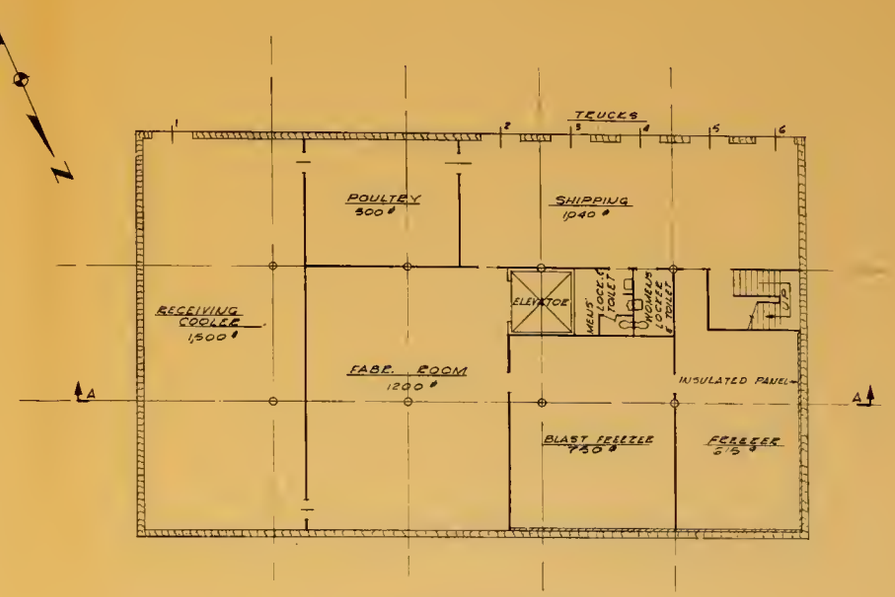
NO. 30 SLINDER PLANS & SECTION

CHAS. T. MAIN, INC.
BOSTON, MASSACHUSETTS — CHARLOTTE, NORTH CAROLINA

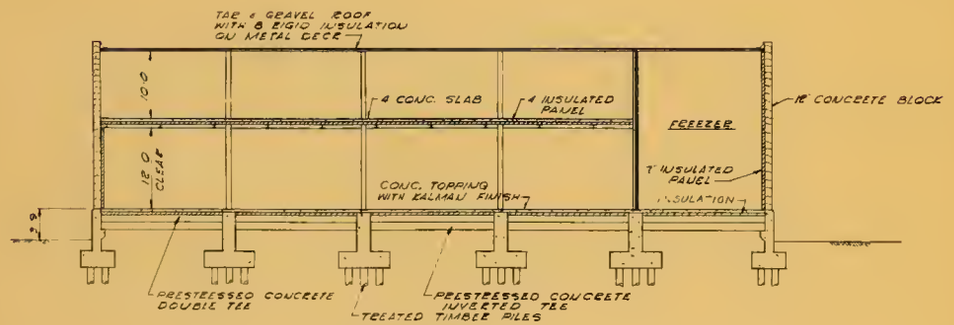
SCALE
CLIENT JOB DWG. NO.
E527.1-E10



PLAN - SECOND FLOOR



PLAN - FIRST FLOOR



SECTION A-A

NOTE :
FOR LOCATION SEE DWG. 2527-1-EE.

1-3-65	REPORT	No	REVISIONS	DATE	
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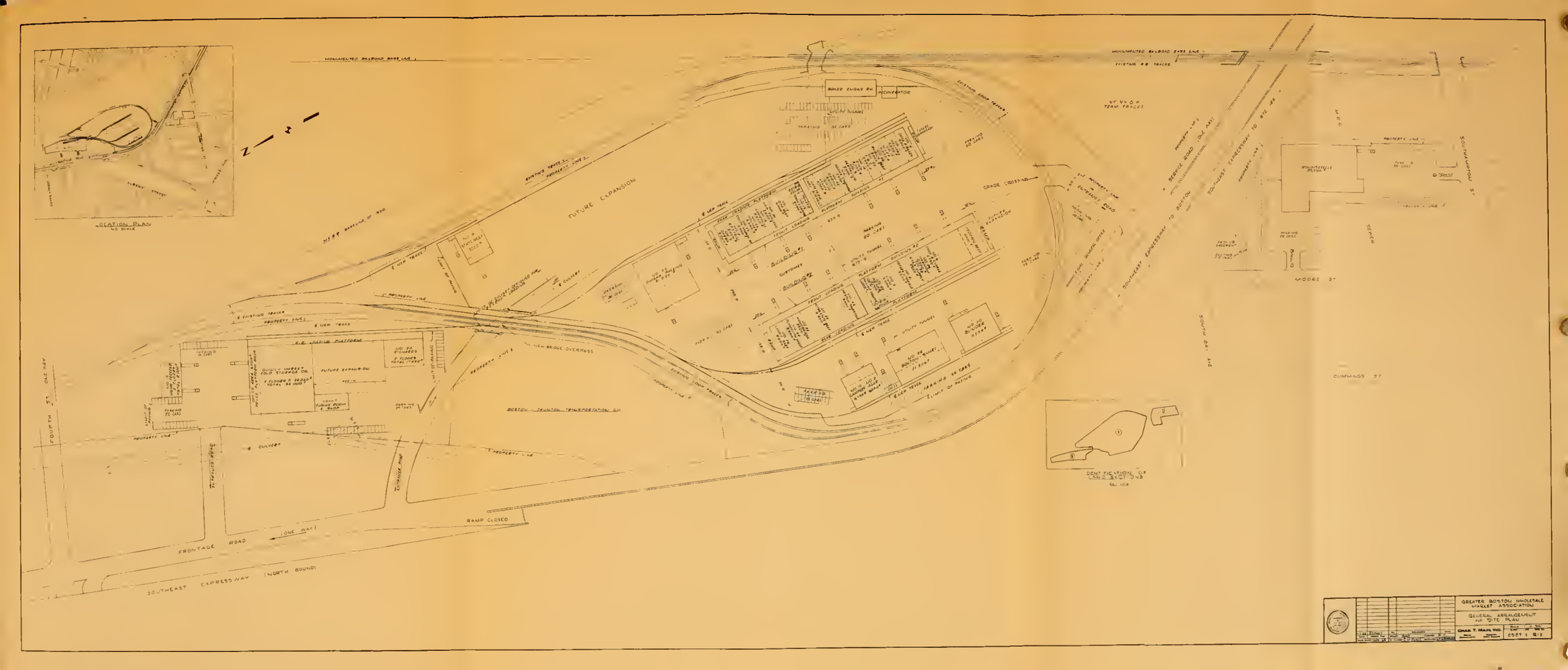
GREATER BOSTON WHOLESALE MARKET ASSOCIATION

NO. 2 HOME FREEZER SUPPLY CO. PLANS & SECTION

CHAS. T. MAIN, INC. BOSTON MASSACHUSETTS CHARLOTTE NORTH CAROLINA

SCALE 1/8" = 1'-0"
CLIENT JOB NUMBER 2527-1-R11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CUMMINGS ST.
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CHAS. T. MAIN, INC.
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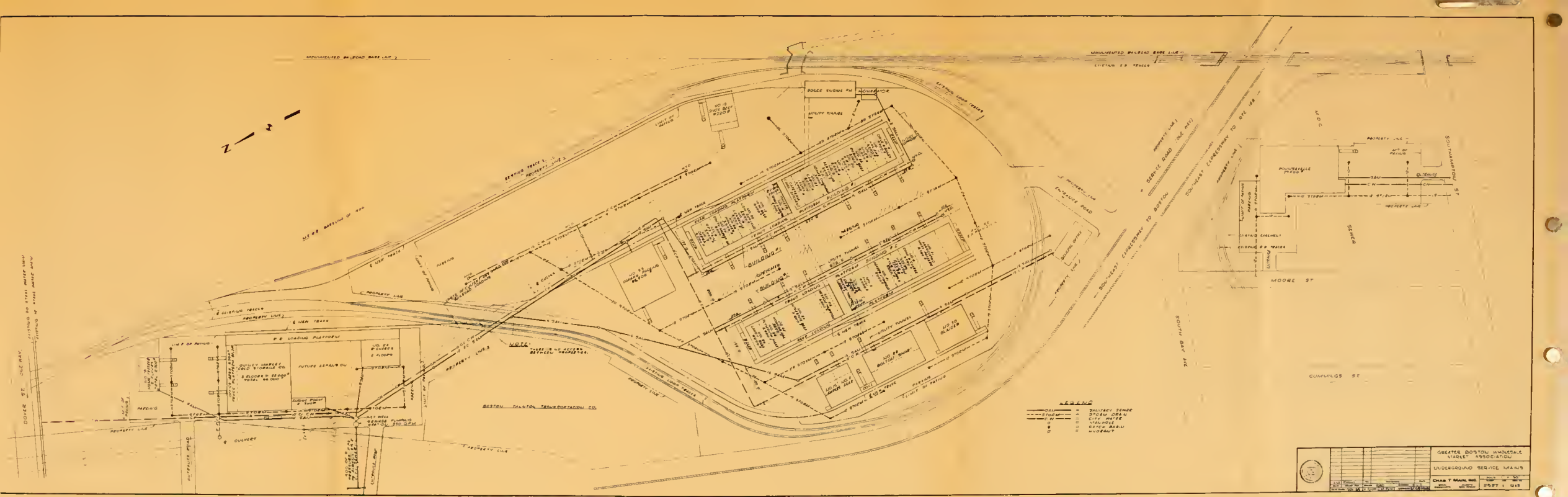
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NOTE: THERE ARE NO OCCUPIED PROPERTIES.
LEGEND
GREATER BOSTON WHOLESALE MARKET ASSOCIATION
UNDERGROUND SERVICE MAINS
CHAS T MAIN INC.
25ET 1 613

REPORT ON SETTLEMENT ANALYSIS
PROPOSED MARKET BUILDINGS
SOUTH BOSTON, MASSACHUSETTS

for
Greater Boston Wholesale Market Associates, Inc.
Boston, Massachusetts

by
Haley & Aldrich, Inc.
Consulting Soil Engineers
Cambridge, Massachusetts

File No. 65-1409

October 1965

HALEY & ALDRICH, INC.
CONSULTING SOIL ENGINEERS
238 MAIN STREET
CAMBRIDGE, MASS. 02142

HARL P. ALDRICH, JR.
JAMES F. HALEY

TELEPHONE
864-3985
AREA CODE 617

27 October 1965
File No. 65-1409

Greater Boston Wholesale Market Associates, Inc.
121 Clinton Street
Boston, Massachusetts

Attention: Mr. Duncan Cotting, President

Subject: Report on Settlement Analysis
Proposed Market Buildings
South Boston, Massachusetts

Gentlemen:

Submitted herewith are five copies of our report on the soil investigation and settlement analysis made for the subject project. This work was done in accordance with our proposal dated 8 September 1965, and was authorized by Mr. D. Cotting on 20 September 1965.

The scope of the analysis for this project was abbreviated from that originally intended as soon as it became apparent that preparation of the site for slab-on-grade floor construction would not be feasible. The combination of subsurface conditions and proposed surface loads producing this result are discussed in the report.

The Design Engineer for this project is Charles T. Main, Inc. The request for Haley and Aldrich, Inc., participation in this study was made by Mr. George Grogan of Charles T. Main, Inc. whose cooperation in making arrangements and supplying pertinent information has been much appreciated.

We are pleased to have had the opportunity of serving you on this project. We trust you will not hesitate to call on us if we may be of any further service.

Very truly yours,
HALEY & ALDRICH, INC.

Robert S. Woolworth

Robert S. Woolworth

Harl P. Aldrich, Jr.

Harl P. Aldrich, Jr.

RSW:mp

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I. INTRODUCTION

1-01. Project

The project for which this study was made involves the construction of eleven buildings to house wholesale food marketing operations. This report presents results of an investigation of subsurface conditions at the site and an analysis of probable settlements, as required to select an appropriate floor support system for four of the proposed buildings. The site is located between Dorchester Avenue and the Southeast Expressway, in South Boston, Massachusetts. The site is within a railroad yard, and overlies a portion of Dorchester Creek. (see Figure 1.)

We understand that the proposed buildings are to be mostly two-story buildings, supported on wood piles driven into the clay known to underlie fill and organic materials at the site. The four buildings would each be about 100 feet wide, and between 350 and 500 feet long, with several lateral partitions in each. Exterior grade is to average about El. 16, with finished floors at El. 20. The buildings are intended to be used almost entirely for meat-cutting and related activities. Concentrated floor loads up to 400 psf are being considered in design, but the time-average load on the floors would probably not exceed 100 psf.

1-02. Scope

The purposes of the investigation were:

1. To explore subsurface conditions, and determine the general distribution and physical characteristics of the soils present at the site.

2. To obtain undisturbed samples of the soft organic soil, and perform appropriate laboratory tests on them; and

3. To make settlement analyses as required to investigate the feasibility of using slab-on-grade construction for the floors in the buildings.

The scope of the work was specifically requested to be limited to that summarized above, and to exclude any consideration of building foundations or site preparation outside buildings, except as these might directly affect floor support.

II. SUMMARY

2-01. Subsurface Conditions

Subsurface conditions at the site, as encountered in the five borings made to obtain undisturbed samples, were essentially similar to those disclosed by earlier borings. Ten to fifteen feet of loose fill were found to overlie ten to twenty-five feet of compressible organic soil. Underlying these materials was irregularly layered compact sand and stiff clay, followed by soft Boston Blue clay to depths as great as 145 feet; where dense granular soil was encountered.

2-02. Compressibility and Settlement

The fill, organic, and soft clay strata were all judged to be relatively compressible. The total settlement of an earth supported slab-on-grade at any one location in the general area under proposed loads, was estimated to range between one and four feet. Post-construction differential settlement of floors would probably range between two and twelve inches. We understand that this settlement is unacceptable.

2-03. Surcharge

The only method of site preparation which would allow the construction of slab-on-grade floors is site preloading. However, the analyses indicate that the height of fill and time period required to successfully surcharge the site are quite large. We understand the time and cost factors make this solution unsuitable.

III. INVESTIGATION

3-01. General

A total of 17 borings were made in the area of the buildings included in this study. The locations of the borings are shown on Figure 1. Twelve of these borings were made prior to our association with the project; the remaining five borings were inspected by Haley & Aldrich personnel.

All elevations referred to in this report were supplied by Charles T. Main, Inc. and are understood to have Boston City Base (-5.65 M.S.L.) as the reference datum. The locations of the latter five borings were established by taping from the locations of the borings already drilled.

3-02. Borings

All borings were drilled by the New England Test Boring Corporation. The first twelve were 2-1/2 inch nominal diameter borings, from which only disturbed samples were recovered. The other five borings were of 4-inch nominal diameter, and were made expressly to obtain "undisturbed" samples of the soft organic soil.

The borings ranged in depth from 22.0 to 96.0 feet. Samples were taken in each stratum encountered in the first set of borings. In the last five borings samples were generally taken at intervals of five feet or less. The disturbed samples were taken by driving a 2-inch O.D. split-barrel sampler 18 inches, with the blows of a 140-pound hammer dropped 30 inches; the blow counts for 6-inch increments of sampler penetration are given on the Logs of Borings.

"Undisturbed" samples were taken with a 3-inch nominal diameter piston sampler; a thin-wall tube is mechanically pressed into the soil to cut and retain the desired sample.

Logs of borings, for the five borings inspected by Haley & Aldrich, are included in this report as Figures 12 through 18. These logs summarize the boring data, including identification of soil types, stratum changes, sampling depths, and other pertinent data.

3-03. Groundwater

The level of water in the borings, generally taken to be representative of the groundwater level, was observed shortly after the borings were completed. The measured depths to water ranged between 2 and 12 feet. Based on the measurements and the fact that Dorchester Creek is tidal, it was assumed for the computations that the groundwater level was about 6 feet below ground surface.

3-04. Laboratory Testing

All undisturbed samples were examined and visually classified in the Haley & Aldrich laboratory. Laboratory classification tests, to verify visual classiciations and to demonstrate the nature of the soils encountered, consisted of 23 natural water content determinations, 5 liquid and plastic limit tests, and 7 tube unit weight determinations. Additional unit weight and water content data were obtained from the strength and compressibility tests. Seven consolidation tests were made to investigate the compressibility of the various soft organic soils encountered. Four unconfined compression tests were made to measure the shearing resistance of the soil.

The test data are summarized on Figures 3 and 4; the results of the consolidation tests, used to predict settlement, are presented graphically on Figures 5 through 11.

It will be noted that no tests were made on the soil and trash fill encountered in the test borings. Because of the extreme variability of the material, tests would not be representative. The nature of much of the fill material is such that soil sampling and testing procedures available would not be appropriate.

IV. SITE CONDITIONS

4-01. General

The area of the proposed buildings is currently nearly level between El. 12.0 and 14.5, but with a gentle depression in the center. Weeds cover the ground and several scattered clumps of small trees are present. No structures are present above ground and the beds for the rails of an old switch-yard are apparent at ground surface.

4-02. Subsurface Conditions

The 17 borings in the project area all encountered a similar sequence of materials -- fill, then organic soil, then stiff clay or compact sand, over soft clay. Generalized soil profiles, drawn along the axes of the proposed buildings, are presented as Figure 2. The characteristics of the materials encountered are summarized below.

The fill was found to range in thickness between 10 and 17 feet. It appears to consist mostly of sand, cinders, and gravel, with varying amounts of rubble and trash. These materials are in a relatively loose condition generally, and would be expected to compress moderately under low to moderate increases in overburden pressure.

The organic soils vary considerably in both composition and characteristics, ranging from a medium-compact slightly organic silty fine sand, to a fibrous organic clay. In general, however, the material is soft and highly compressible. Settlement under the weight of proposed fill is expected to be considerable, and to occur at a relatively slow rate.

The irregular sand and gravel layers are compact, and may be assumed essentially incompressible for this study.

The clay stratum ("Boston Blue Clay") is stiff and relatively incompressible in its upper portions. Below El. -25, however, it appears to be generally soft, and where it has not been precompressed by overburden or desiccation, it is quite compressible. This stratum is indicated by four borings in the vicinity to extend to depths of 90 to 145 feet below the surface.

The borings which extended through the clay encountered a dense heterogeneous material which we interpret to be glacial till. It is reasonable to expect that bedrock would be encountered directly below the glacial till. In any case, the underlying material would not be more than slightly compressible under high loads.

4-03. Groundwater

Although groundwater readings were taken in all borings, the data are not consistent enough to draw a draw a definitive line for the water table. The readings range mostly between Elevation 5 and 9, and average close to Elevation 7 (about 6 feet below ground surface). This figure appears to be reasonable with respect to the site environment, and is assumed to be representative in this report.

V. ANALYSES

5-01. General

The problem being considered in this investigation is the settlement of floors of slab-on-grade construction in four buildings. Consideration of structural floor support and building support, are not included. Accordingly, our analyses were concerned with: first, computing probable settlements of floors following construction, without taking preventive measures, and second, assuming these settlements to be detrimentally large, considering what might be done to avert or alleviate these settlements.

There are three potential sources of settlement: The fill, the organic soil, and the deep clay. The portion of total settlement predicted to occur in the organic soil is of greater magnitude than in the other strata. Also, it appears that the organic stratum would be the primary source of post-construction differential settlement of the building. Hence our analyses were concentrated on the organic stratum. In the sections which follow, the fill and clay strata are treated briefly first, followed by a more thorough discussion of the predicted behaviour of the organic soil stratum.

5-02. Fill Stratum

Settlements originating in the existing fill, due to the load of new fill, would probably average between 6 and 12 inches. This is only an estimate based on past experience. As noted in Section 3-04, it was not feasible to test this material. However, the fill is basically granular in nature, and consequently it would be expected that whatever settlements do occur would take place rapidly. This means that in a "normal" construction schedule, where all new fill was in place for a month or more before floors were constructed, post-

construction differential settlements originating in this stratum would be quite small and probably unimportant. If the site were surcharged (a temporary load greater than design load) before constructing the floors, it would be quite certain that post-construction settlement would be negligible.

The settlement discussed here is that of the "mechanical" variety--increased load causing densification of the material, with a consequent reduction in stratum thickness. There is another source of settlement in this stratum -- that of decomposition of the trash fill materials. It is believed, however, that the rate of decomposition of materials would be sufficiently slow to be quite unimportant, particularly in relation to the other settlements.

5-03. Deep Clay

The "Boston Blue Clay" is quite stiff in the upper portion of the stratum due to desiccation; this drying out has precompressed the soil so that it is generally only slightly compressible under moderate increases in load. Our analysis of test data from a nearby project indicates that the clay is precompressed (previously loaded to a pressure greater than that currently on it) for essentially its full depth. The amount of precompression is greatest near the top of the stratum, and generally decreases with depth. Our analysis also suggests, however, that in some areas, near the bottom of the stratum, the clay may not be precompressed. Our computations indicate a potential settlement on the order of 4 to 6 inches, originating in the clay.

However, as the compressible material is relatively deep, and all portions of the building are supported above it, these settlements would probably be observed at the surface only as a general area subsidence, if at all noticeable. There would not be any obvious differential settlement between the floor and building, assuming the building was supported by short piles and/or caissons bearing near the top of the clay stratum.

5-04. Organic Stratum

The samples of organic soil recovered from the five undisturbed borings were quite variable according to their classifications, ranging from an organic clay to a slightly organic clayey silt. With respect to the consolidation test data, however, the samples were much more similar, fitting into two narrow ranges of compressibility; two samples had approximately twice the compressibility of the other samples. The settlement analyses were made on the basis of this range of values. With respect to time-deflection rates, all samples, including those containing appreciable percentages of sand, indicated that consolidation of the organic stratum should be expected to occur gradually over an extended period.

The test data did not indicate any discernable amount of pre-compression to have occurred in the organic stratum. Hence predicted significant settlements under the load of new fill for the proposed grades -- about 3 feet of general area fill, plus an additional 4 feet under buildings -- are quite large, varying from a minimum of about 4 inches to a maximum on the order of 3 feet. This considerable range is the result of existing and imposed conditions - the organic soil varying from 5 to 25 feet in thickness, the factor of two in soil compressibility, and a factor greater than two in the range of added fill loads.

The term "significant settlement", as used above, signifies the settlement occurring from when load is first applied to the point when subsequent settlements become essentially negligible. "Negligible" is used in this report to describe settlements predicted to occur at a rate of less than 0.2 inches in one year. Settlements would continue to occur after this point, but should prove unimportant in magnitude.

The rates at which settlements are expected to occur are also quite variable, as they are related to the thickness and permeability of the compressible stratum. In all cases, the initial settlement as load is applied is quite high, decreasing slowly as time passes. The following table of settlements versus time gives an approximate idea of the rate of consolidation for the condition of permeable soil lying directly above and below the stratum of organic soil.

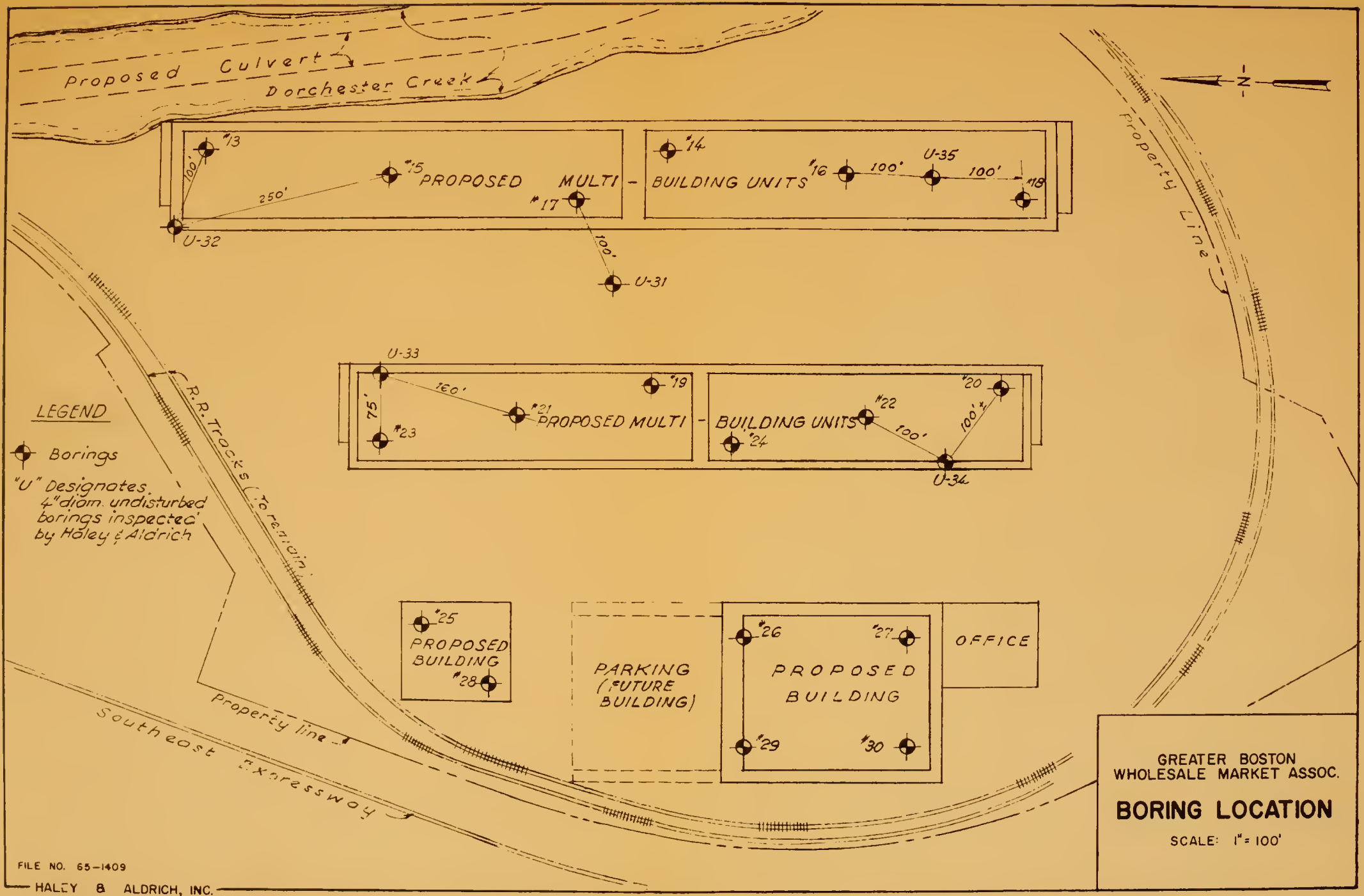
Time	5-Foot Stratum	25-Foot Stratum
1 month	3.0 (inches)	11 (inches)
6 months	3.8	21
1 year	4.1	24
5 years	5.0	31
25 years	5.8	37

5-05. Surcharge Procedure

The magnitude of the predicted settlements is sufficiently large to preclude any real consideration of placing floor slabs on grade without some form of pre-construction foundation treatment. The only form of treatment which even appeared feasible in this type of soil was site preloading or surcharging.

The basic principle of surcharging is quite simple - the site is loaded so that all compressible portions of the foundation are subjected to pressures higher than those anticipated under final design loads. In this manner, consolidation is forced to occur at a more rapid rate than would take place under design load only; the greater the excess load (over design load), the more quickly the required settlements are developed. However, the time required at this site for the thicker layers is very large, making the idea of surcharging impractical for the very short construction schedule being considered (6 to 8 months).

For example, a surcharge of about 8 feet of fill over the general area, plus an additional 4 feet in the building area, all above final grades, would require not less than 2 years to effectively preclude most subsequent settlement. Even then, up to 2 inches of settlement could be expected in the next 10 years. To complete the surcharge in about one year, the analyses indicates 12 feet of fill to be required over the general area, with an additional 5 feet in the building areas. The time period involved in these schemes is greater than that scheduled for the entire construction period; also the costs appear to be relatively high. Consequently, following discussion of these results with the design engineer, further analyses were terminated.



GREATER BOSTON WHOLESALE MARKET ASSOC.

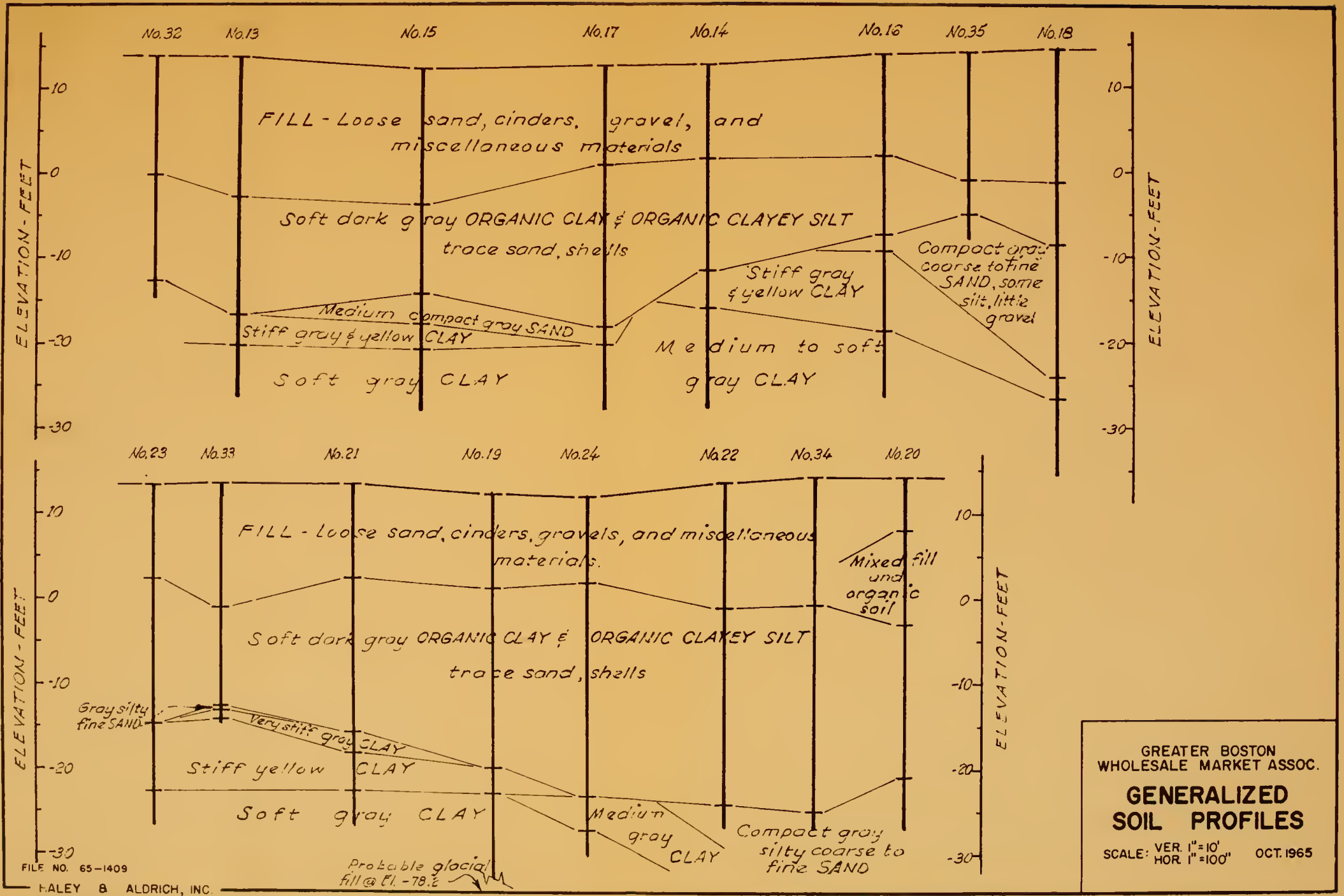
BORING LOCATION

SCALE: 1" = 100'

FILE NO. 65-1409

HALEY & ALDRICH, INC.
CONSULTING SOIL ENGINEERS

Figure 1



GREATER BOSTON WHOLESALE MARKET ASSOC.

GENERALIZED SOIL PROFILES

SCALE: VER. 1" = 10' HOR. 1" = 100" OCT. 1965

FILE NO. 65-1409

HALEY & ALDRICH, INC.
CONSULTING SOIL ENGINEERS

Figure 2

HALEY & ALDRICH
CONSULTING SOIL ENGINEERS

GREATER BOSTON WHOLESALE MARKET ASSOCIATION — File No. 65-1409

SUMMARY OF LABORATORY TEST RESULTS

BORING & SAMPLE NUMBER	DESCRIPTION	DEPTH (FEET)	TEST NO.	NATURAL WATER CONTENT %	ATTERBERG LIMITS LL	ATTERBERG LIMITS PL	UNIT WEIGHT LB/CU.FT.	UNCONFINED TEST COMPRESSIVE STRENGTH PSF	UNCONFINED TEST STRAIN %	CONSOLIDATION MAX. PAST PRESSURE TON /SQ. FT.	CONSOLIDATION C_c	OTHER TESTS
U31-U1	Soft dark gray slightly organic fine sandy SILT, slightly plastic, trace shells and fibers; grading to SILTY CLAY with depth	15.8	W1	36.0								
		16.3	W2	34.8			(116)*					
		16.5	W3	37.3								
		16.7	C1	42.0			108			0.46	0.32	
		16.8	L1	38.0	42	22						
U32-U1	Stiff gray-brown fibrous organic CLAYEY SILT, trace fine sand and shells	17.8	W4	133.9								
		18.0	C2	146.5			79			0.72	2.22	
		18.1	L2	123.3	167	90						
		18.4	UC1	133.4			80	950	5.0			
		18.9	W5	155.6			(85)					
U32-U2	Soft to medium stiff dark gray organic CLAY	22.5	W6	86.8								
		22.6	C3	114.3			84			0.58	1.62	
		22.7	L3	113.6	120	46						
		23.1	UC2	129.1			80	985	6.8			
		23.5	W7	114.2								
		23.9	W8	165.7			(82)					
U33-U1	Medium stiff gray organic CLAYEY SILT, little fine sand, trace shells	17.9	W20	40.4								
U33-U2	Soft dark gray organic SILTY CLAY, many shells	20.5	W9	53.2								
		21.1	C4	42.0			111			0.75	0.42	
		21.2	L4	39.8	42	23						
		21.5	UC3	42.9			110	765	3.4			
		21.8	W10	44.3			(109)					

* Figures in parentheses are average for all of tube sample

Figure 3

HALEY & ALDRICH
CONSULTING SOIL ENGINEERS

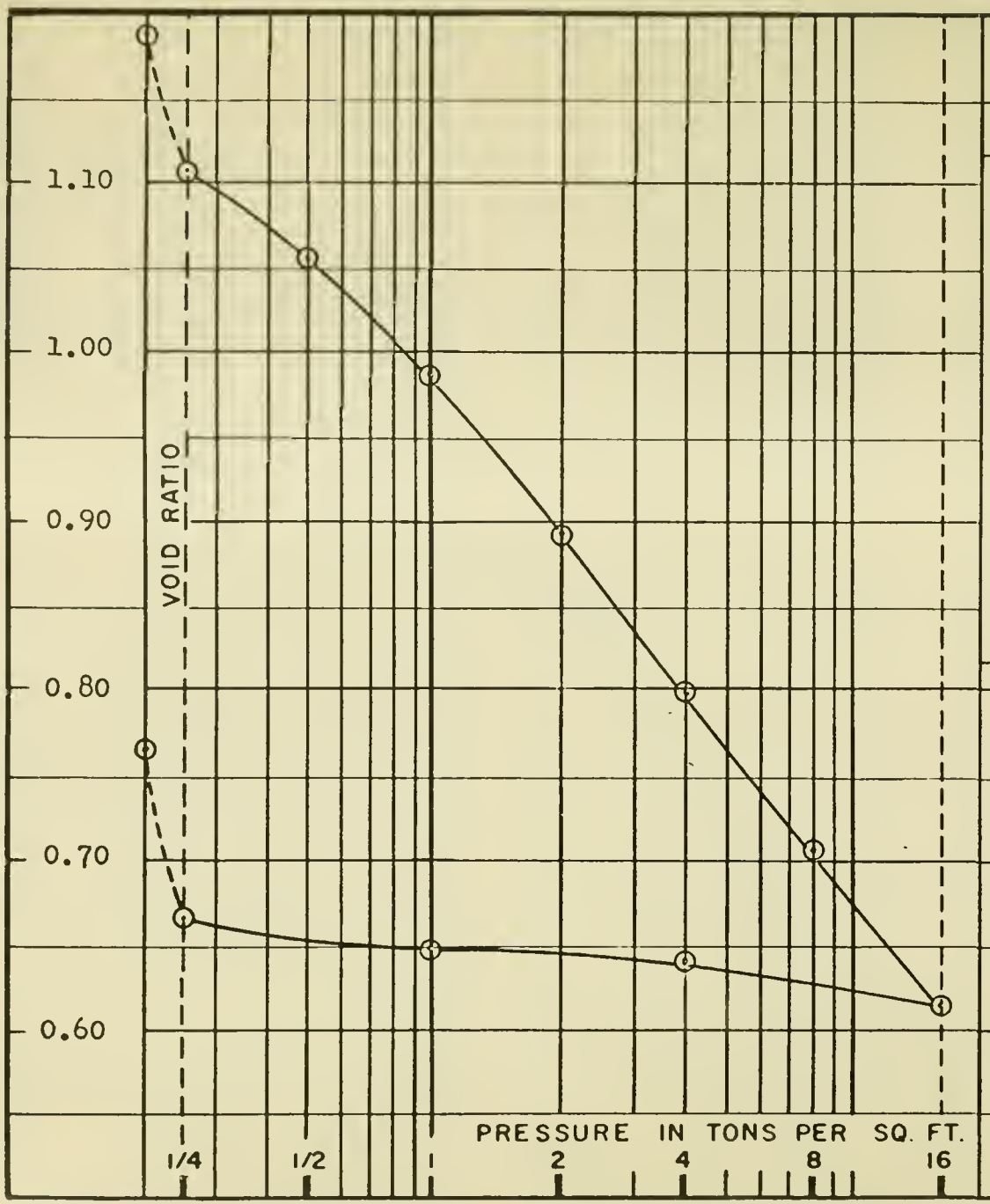
GREATER BOSTON WHOLESALE MARKET ASSOCIATION — File No. 65-1409

SUMMARY OF LABORATORY TEST RESULTS

BORING & SAMPLE NUMBER	DESCRIPTION	DEPTH (FEET)	TEST NO.	NATURAL WATER CONTENT %	ATTERBERG LIMITS		UNIT WEIGHT LB/CU.FT.	UNCONFINED TEST		CONSOLIDATION		OTHER TESTS
					LL	PL		COMPRESSIVE STRENGTH PSF	STRAIN %	MAX. PAST PRESSURE TON/SQ. FT.	C_c	
U33-U3	Gray fine SAND, some clayey silt, (medium stiff) slightly organic	25.9	W21	24.4								
U34-U1	Soft dark gray organic CLAY, traces miscellaneous fill	19.9	W22	46.9								
U34-U2	Soft gray organic CLAYEY SILT, little fine sand, trace shells	23.2	W11	55.1								
		23.4	W12	53.9								
		23.5	C5	53.8			106			0.80	0.50	
		23.7	W13	43.8			(104)					
U34-U3	Soft dark gray organic SILTY CLAY, trace fine sand, shells	27.2	W14	57.6								
		27.4	W15	58.3								
		27.6	C6	54.0			105			0.84	0.50	
		27.8	W16	59.4			(99)					
U34-U4	Soft dark brown organic CLAYEY SILT, some fine sand	37.2	W17	54.1								
		37.4	W18	53.6								
		37.6	C7	62.2			98			1.3	0.64	
		37.7	L5	54.5	57	37						
		38.1	UC4	42.5			111	935	3.8			
		38.4	W19	36.1			(105)					
U35-U1	Soft to medium stiff gray organic CLAYEY SILT, trace fine sand, shells	17.9	W23	52.7								

Figure 4

HALEY & ALDRICH
CONSULTING SOIL ENGINEERS



SOIL DESCRIPTION Soft dark gray organic SILTY CLAY, trace sand, shells, and fibers

BORING U-31 SAMPLE U-1 DEPTH 16.7

WATER CONTENT
NATURAL 42.0%
AFTER TEST 29.8%

ATTERBERG LIMITS
LIQUID LIMIT
PLASTIC LIMIT
NATURAL WATER CONTENT

HEIGHT OF SOIL SOLIDS 0.4584 in.

INITIAL VOID RATIO 1.1815

Greater Boston
Wholesale Market Association

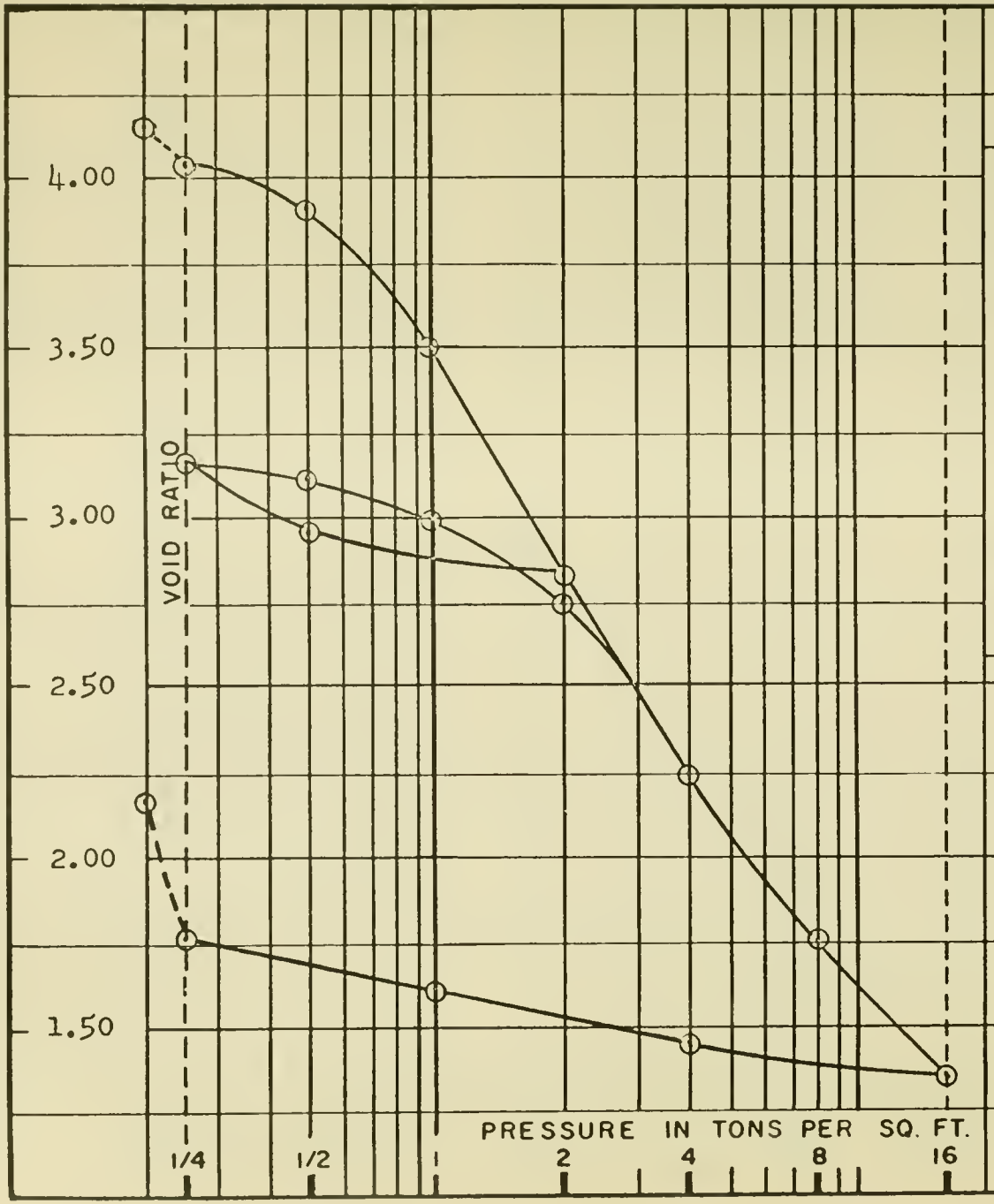
CONSOLIDATION TEST
NO. C-1

FILE NO. 65-1409

DATE October 1965

Figure 5

HALEY & ALDRICH
CONSULTING SOIL ENGINEERS



SOIL DESCRIPTION Stiff gray-brown fibrous organic CLAYEY SILT, trace fine sand and shells

BORING U-32 SAMPLE U-1 DEPTH 18.0

WATER CONTENT
NATURAL 146.5%
AFTER TEST 77.5%

ATTERBERG LIMITS
LIQUID LIMIT
PLASTIC LIMIT
NATURAL WATER CONTENT

HEIGHT OF SOIL SOLIDS 0.1926 in.

INITIAL VOID RATIO 4.1921

Greater Boston
Wholesale Market Association

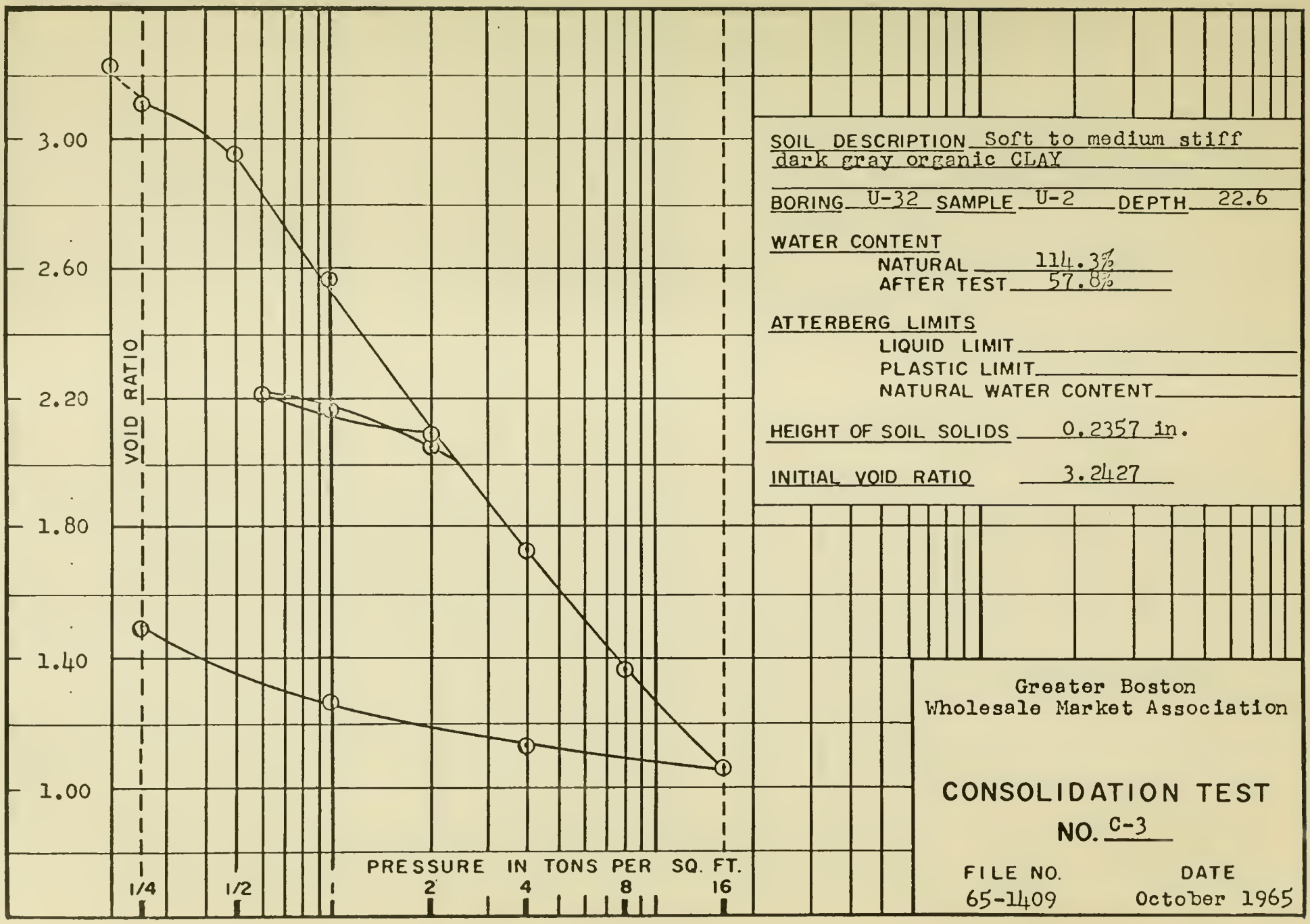
CONSOLIDATION TEST

NO. C-2

FILE NO. 65-1409

DATE October 1965

Figure 6



SOIL DESCRIPTION Soft to medium stiff dark gray organic CLAY

BORING U-32 SAMPLE U-2 DEPTH 22.6

WATER CONTENT
NATURAL 114.3%
AFTER TEST 57.8%

ATTERBERG LIMITS
LIQUID LIMIT
PLASTIC LIMIT
NATURAL WATER CONTENT

HEIGHT OF SOIL SOLIDS 0.2357 in.

INITIAL VOID RATIO 3.2427

Greater Boston
Wholesale Market Association

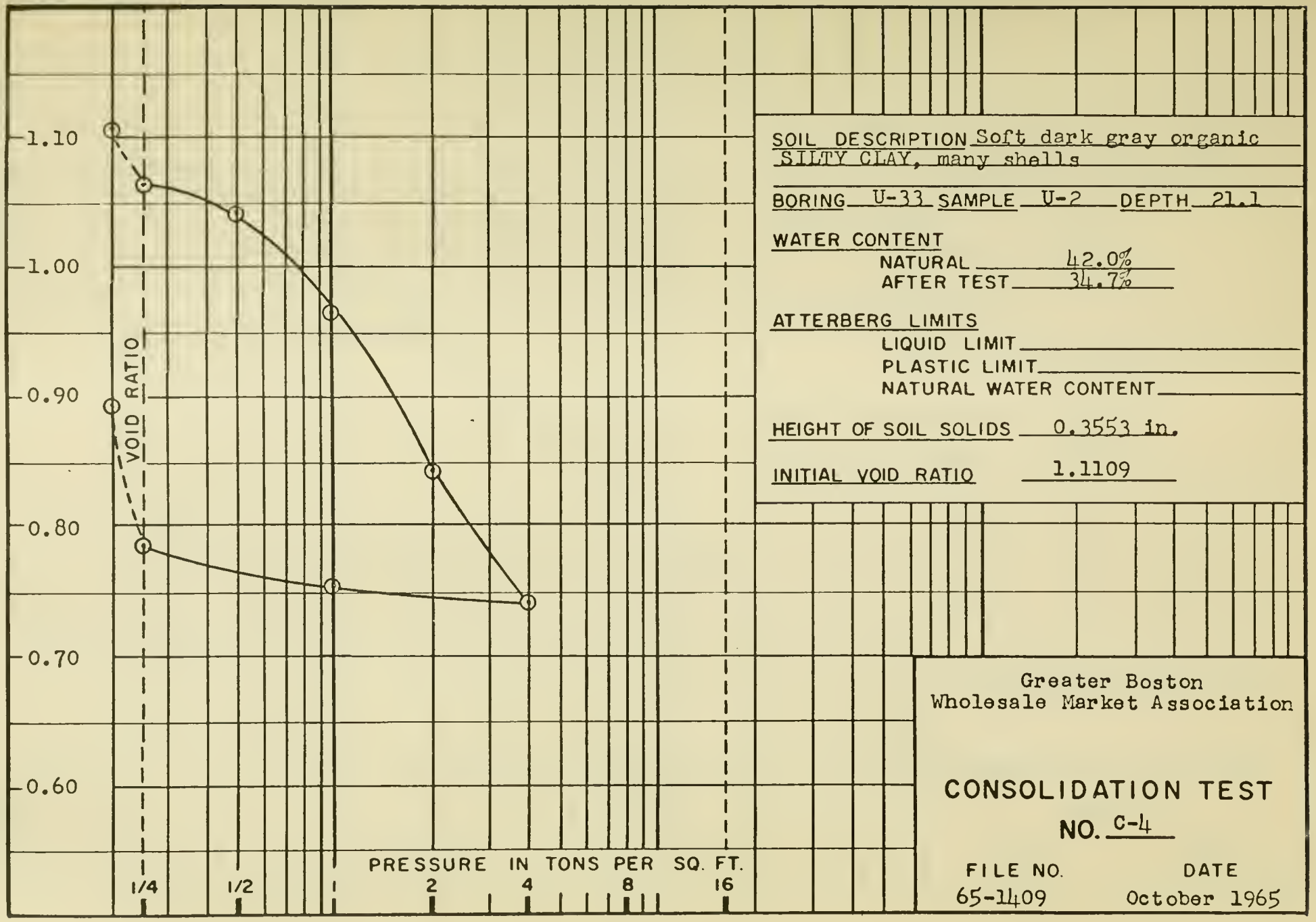
CONSOLIDATION TEST
NO. C-3

FILE NO. 65-1409

DATE October 1965

HALEY & ALDRICH
CONSULTING SOIL ENGINEERS

Figure 7



SOIL DESCRIPTION Soft dark gray organic SILTY CLAY, many shells

BORING U-33 SAMPLE U-2 DEPTH 21.1

WATER CONTENT
NATURAL 42.0%
AFTER TEST 34.7%

ATTERBERG LIMITS
LIQUID LIMIT
PLASTIC LIMIT
NATURAL WATER CONTENT

HEIGHT OF SOIL SOLIDS 0.3553 in.

INITIAL VOID RATIO 1.1109

Greater Boston
Wholesale Market Association

CONSOLIDATION TEST
NO. C-4

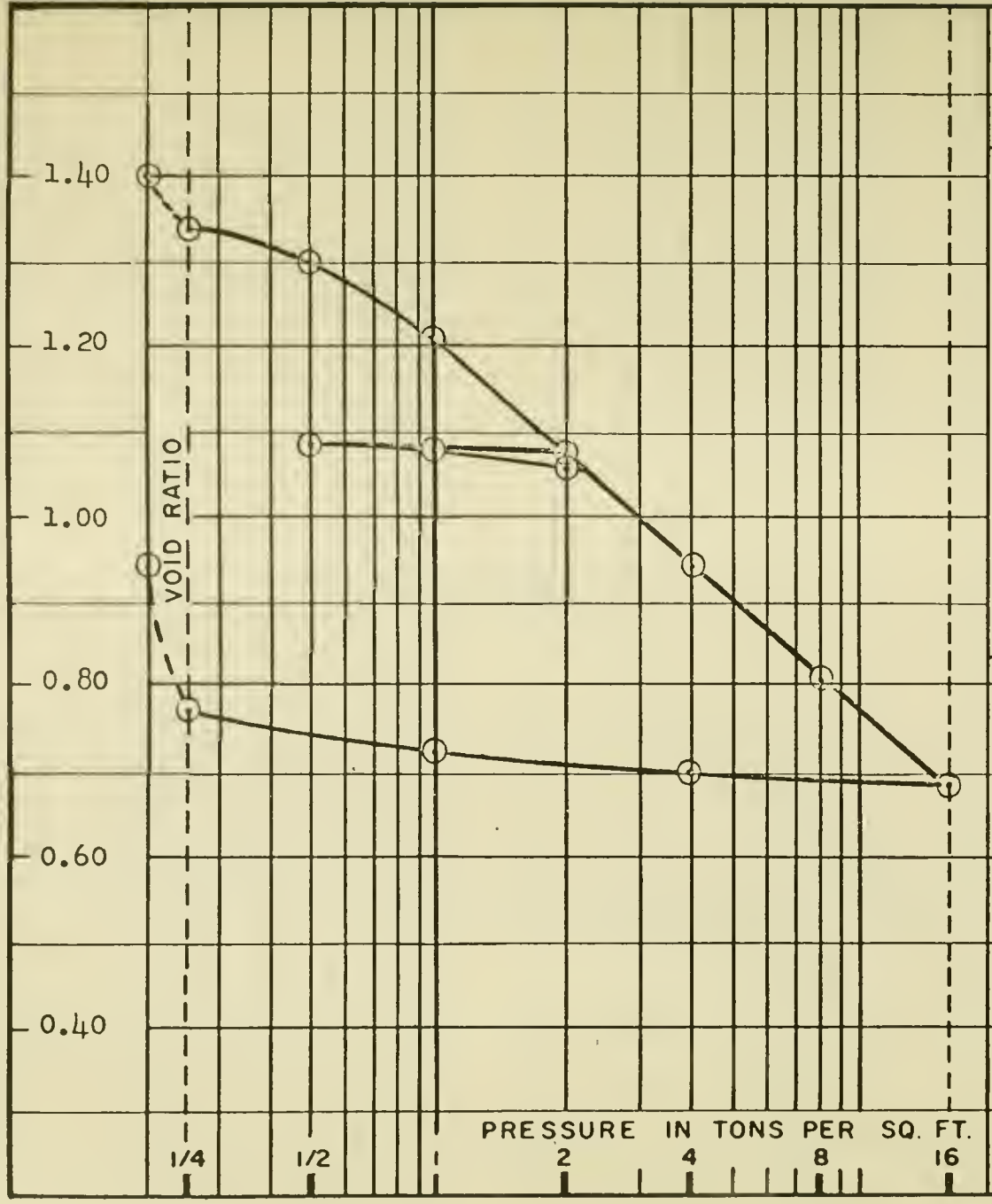
FILE NO. 65-1409

DATE October 1965

HALEY & ALDRICH
CONSULTING SOIL ENGINEERS

Figure 8

HALEY & ALDRICH
CONSULTING SOIL ENGINEERS



SOIL DESCRIPTION Soft gray organic CLAYEY SILT, little fine sand, trace shells

BORING U-34 SAMPLE U-2 DEPTH 23.5

WATER CONTENT
NATURAL 53.8%
AFTER TEST 35.6%

ATTERBERG LIMITS
LIQUID LIMIT
PLASTIC LIMIT
NATURAL WATER CONTENT

HEIGHT OF SOIL SOLIDS 0.4162 in.

INITIAL VOID RATIO 1.4027

Greater Boston
Wholesale Market Association

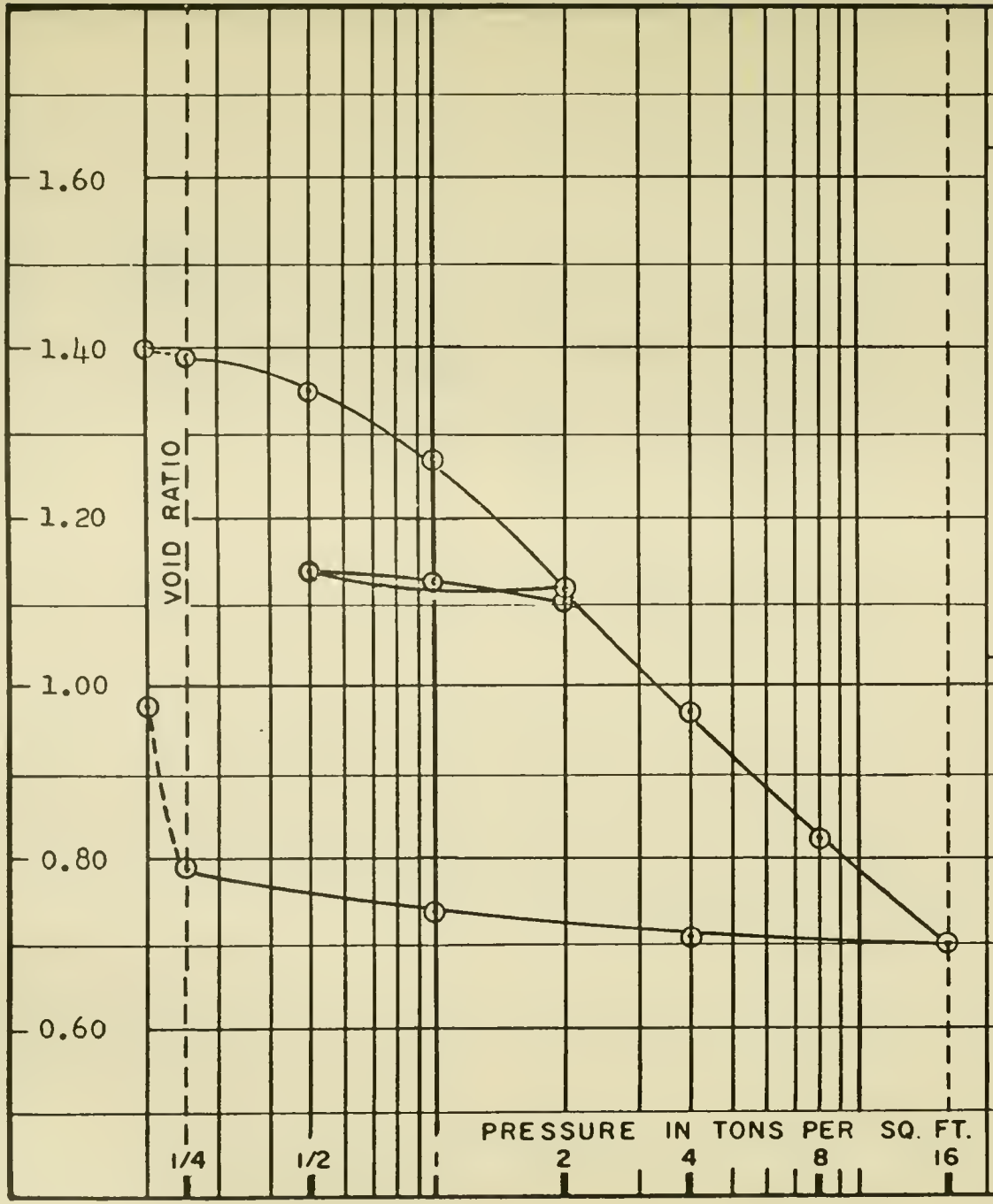
CONSOLIDATION TEST
NO. C-5

FILE NO. 65-1409

DATE October 1965

Figure 9

HALEY & ALDRICH
CONSULTING SOIL ENGINEERS



SOIL DESCRIPTION Soft dark gray organic SILTY CLAY, trace fine sand, shells

BORING U-34 SAMPLE U-3 DEPTH 27.6

WATER CONTENT
NATURAL 54.0%
AFTER TEST 36.6%

ATTERBERG LIMITS
LIQUID LIMIT
PLASTIC LIMIT
NATURAL WATER CONTENT

HEIGHT OF SOIL SOLIDS 0.4120 in.

INITIAL VOID RATIO 1.4272

Greater Boston
Wholesale Market Association

CONSOLIDATION TEST

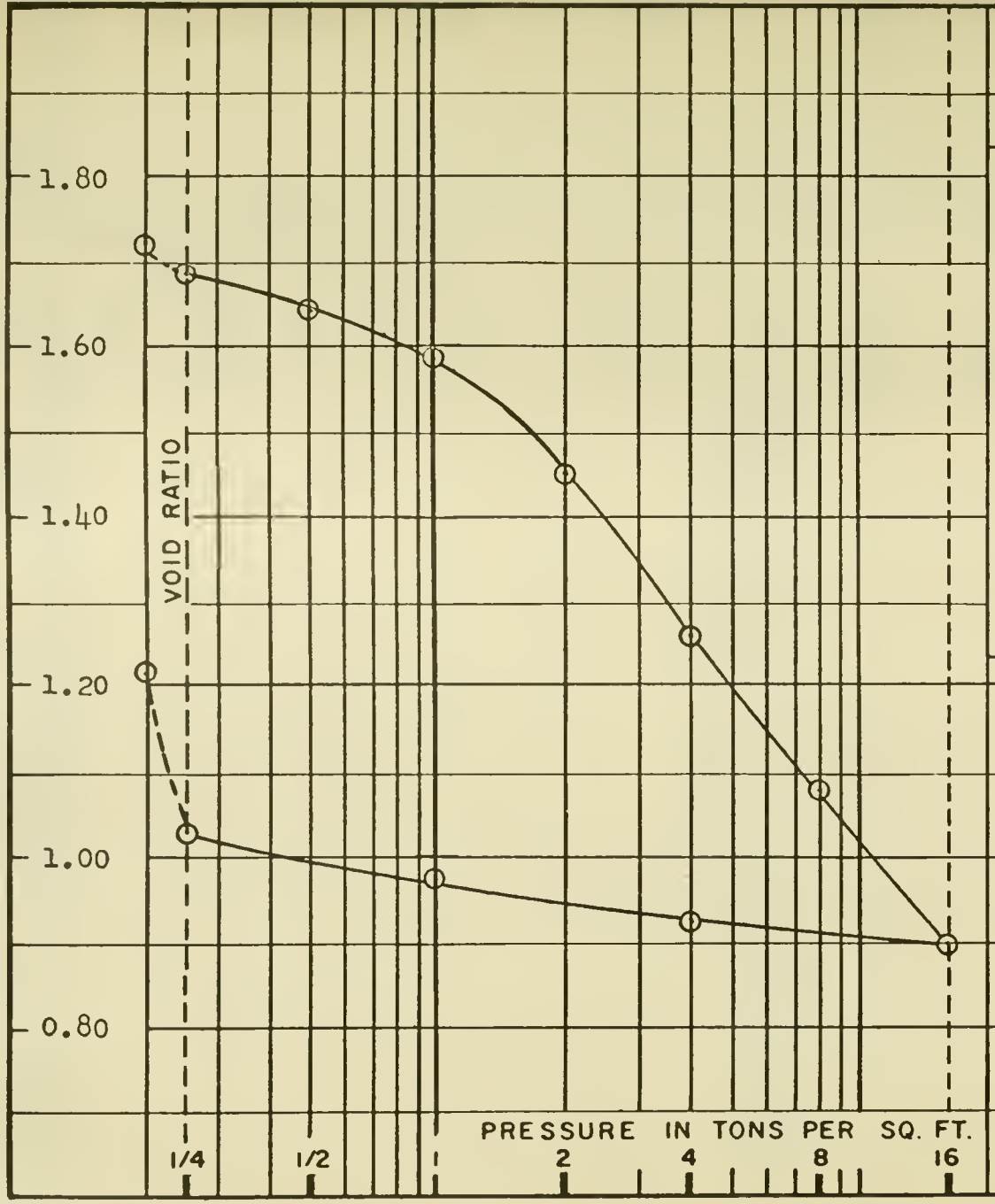
NO. C-6

FILE NO. 65-1409

DATE October 1965

Figure 10

HALEY & ALDRICH
CONSULTING SOIL ENGINEERS



SOIL DESCRIPTION Soft dark brown organic CLAYEY SILT, some fine sand

BORING U-34 SAMPLE U-4 DEPTH 37.6

WATER CONTENT
NATURAL 62.2%
AFTER TEST 44.0%

ATTERBERG LIMITS
LIQUID LIMIT
PLASTIC LIMIT
NATURAL WATER CONTENT

HEIGHT OF SOIL SOLIDS .3656 in.

INITIAL VOID RATIO 1.7352

Greater Boston
Wholesale Market Association

CONSOLIDATION TEST
NO. C-7

FILE NO. 65-1409

DATE October 1965

Figure 11

HALEY & ALDRICH, INC.
CONSULTING SOIL ENGINEERS

TEST BORING REPORT

HOLE NO. U-31

PROJECT: Greater Boston Wholesale Market Association
CLIENT: C. T. Main, Inc.
CONTRACTOR: New England Test Boring

FILE NO. 65-1409
SHEET NO. 1 of 2
LOCATION: See Figure 1
ELEVATION: 12.3 ±
DATE START: 9-8-65
DATE FINISH: 9-9-65
DRILLER: A. Chiradonna
INSPECTOR: D. Woodhouse

GROUNDWATER		DEPTH TO:		
DATE	TIME	WATER	BOTTOM OF CASING	BOTTOM OF HOLE
9-9	3:30PM	6'	12.5	32.0

	CASING	SAMPLER	CORE BARREL
TYPE:		S	T
SIZE I.D.:	4"	1 3/8"	2.8"
HAMMER WT.:	300#	140#	
HAMMER FALL:	18"	30"	

SCALE IN FEET	STRATA CHANGE	CASING BLOWS PER FOOT	SAMPLER BLOWS PER 6 INCHES	SAMPLE NUMBER	SAMPLE DEPTH RANGE	FIELD CLASSIFICATION AND REMARKS
0				S1	0.0	
					2.0	Very loose, gray black, intermixture of cinders, coal, dust, rubble, ashes, sand and miscellaneous debris
						- FILL -
5				S2	5.0	
					7.0	
10	10.0				10.0	
				S3		
					12.0	
					13.0	Soft dark gray slightly organic fine sandy SILT, slightly plastic; and organic SILTY CLAY; trace shells and fibers. Small amounts of trash fill in upper portion of stratum
				NR		
15					15.0	
				U1		
					17.0	
20					20.0	
				NR		
					22.0	
				NR		
					24.0	
25				S4		
					26.0	
					26.5	
				NR		
					28.5	
30	30.0					

BLOWS/FT.	DENSITY
0-4	VERY LOOSE
4-10	LOOSE
10-30	MEDIUM COMPACT
30-50	COMPACT
50+	VERY COMPACT

BLOWS/FT.	CONSISTENCY
0-2	VERY SOFT
2-4	SOFT
4-8	MEDIUM STIFF
8-15	STIFF
15-30	VERY STIFF

SAMPLE IDENTIFICATION	
S	SPLIT SPOON
T	THIN WALL TUBE
U	UNDISTURBED PISTON
O	OPEN END ROD
W	WASH SAMPLE

SUMMARY
OVERBURDEN: 32.0'
ROCK:
SAMPLES: 5S - 1T
HOLE NO. U31

HALEY & ALDRICH, INC.
CONSULTING SOIL ENGINEERS

TEST BORING REPORT

HOLE NO. U-31

PROJECT: Greater Boston Wholesale Market Association
CLIENT: C. T. Main, Inc.
CONTRACTOR: New England Test Boring

FILE NO. 65-1409
SHEET NO. 2 of 2
LOCATION:
ELEVATION:
DATE START:
DATE FINISH:
DRILLER:
INSPECTOR:

GROUNDWATER		DEPTH TO:		
DATE	TIME	WATER	BOTTOM OF CASING	BOTTOM OF HOLE

	CASING	SAMPLER	CORE BARREL
TYPE:			
SIZE I.D.:			
HAMMER WT.:			
HAMMER FALL:			

SCALE IN FEET	STRATA CHANGE	CASING BLOWS PER FOOT	SAMPLER BLOWS PER 6 INCHES	SAMPLE NUMBER	SAMPLE DEPTH RANGE	FIELD CLASSIFICATION AND REMARKS
30	30.0		2 2 2, 3	S5	30.0 32.0	Loose, gray slightly organic silty medium to fine SAND, few fibers Bottom of Boring
35						
40						
45						
50						
55						
60						

BLOWS/FT.	DENSITY
0-4	VERY LOOSE
4-10	LOOSE
10-30	MEDIUM COMPACT
30-50	COMPACT
50+	VERY COMPACT

BLOWS/FT.	CONSISTENCY
0-2	VERY SOFT
2-4	SOFT
4-8	MEDIUM STIFF
8-15	STIFF
15-30	VERY STIFF

SAMPLE IDENTIFICATION	
S	SPLIT SPOON
T	THIN WALL TUBE
U	UNDISTURBED PISTON
O	OPEN END ROD
W	WASH SAMPLE

SUMMARY
OVERBURDEN: 32.0'
ROCK:
SAMPLES: 5S - 1T
HOLE NO. U31

HALEY & ALDRICH, INC.
CONSULTING SOIL ENGINEERS

TEST BORING REPORT

HOLE NO. U-32

PROJECT: Greater Boston Wholesale Market Association
CLIENT: C. T. Main, Inc.
CONTRACTOR: New England Test Boring

FILE NO. 65-1409
SHEET NO. 1 of 1
LOCATION: See Figure 1
ELEVATION: 13.5 ±
DATE START: 9-10-65
DATE FINISH: 9-10-65
DRILLER: A. Chiradonna
INSPECTOR: D. Woodhouse

GROUNDWATER		DEPTH TO:		
DATE	TIME	WATER	BOTTOM OF CASING	BOTTOM OF HOLE
9-10	2:00	5'	15.0	28.5

	CASING	SAMPLER	CORE BARREL
TYPE:		S	T
SIZE I.D.:	4"	1 3/8"	2.8"
HAMMER WT.:	300#	140#	
HAMMER FALL:	18"	30"	

SCALE IN FEET	STRATA CHANGE	CASING BLOWS PER FOOT	SAMPLER BLOWS PER 6 INCHES	SAMPLE NUMBER	SAMPLE DEPTH RANGE	FIELD CLASSIFICATION AND REMARKS
0						
			2, 1	S1	1.0	Very loose intermixture of cinders, organic matter, Gravel, Silt and miscellaneous trash and rubble
			2, 2		3.0	
5			1, 2	S2	5.0	
			1, 1		7.0	- FILL -
10			1, 0	S3	11.0	
	13.0		1, 0		13.0	Stiff gray-brown fibrous organic CLAYEY SILT, trace fine sand and shells
15			1, 0	S4	15.0 16.0	
				U1	17.0 19.0	- grading to -
20						
				U2	22.0 24.0	Soft to medium stiff dark gray organic CLAY
25						
	26.5		5, 6, 8, 8	S5	26.5 28.5	Very stiff gray CLAY, grading to mottled yellow-gray CLAY
30						↳ Bottom of Boring

BLOWS/FT.	DENSITY
0-4	VERY LOOSE
4-10	LOOSE
10-30	MEDIUM COMPACT
30-50	COMPACT
50+	VERY COMPACT

BLOWS/FT.	CONSISTENCY
0-2	VERY SOFT
2-4	SOFT
4-8	MEDIUM STIFF
8-15	STIFF
15-30	VERY STIFF

SAMPLE IDENTIFICATION	
S	— SPLIT SPOON
T	— THIN WALL TUBE
U	— UNDISTURBED PISTON
O	— OPEN END ROD
W	— WASH SAMPLE

SUMMARY	
OVERBURDEN:	28.5'
ROCK:	
SAMPLES:	5S - 2T
HOLE NO.	U32

HALEY & ALDRICH, INC.
CONSULTING SOIL ENGINEERS

TEST BORING REPORT

HOLE NO. U-33

PROJECT: Greater Boston Wholesale Market Association
CLIENT: C. T. Main, Inc.
CONTRACTOR: New England Test Boring

FILE NO. 65-1409
SHEET NO. 1 of 1
LOCATION: See Figure 1
ELEVATION: 13.3 ±
DATE START: 9-13-65
DATE FINISH: 9-13-65
DRILLER: A. Chiradonna
INSPECTOR: D. Woodhouse

GROUNDWATER		DEPTH TO:		
DATE	TIME	WATER	BOTTOM OF CASING	BOTTOM OF HOLE
9-13	3:00	6'6"	17.5	28

	CASING	SAMPLER	CORE BARREL
TYPE:		S	T
SIZE I.D.:	4"	1 3/8'	2.8"
HAMMER WT.:	300#	140#	
HAMMER FALL:	18"	30"	

SCALE IN FEET	STRATA CHANGE	CASING BLOWS PER FOOT	SAMPLER BLOWS PER 6 INCHES	SAMPLE NUMBER	SAMPLE DEPTH RANGE	FIELD CLASSIFICATION AND REMARKS
0						
			2	S1	2.0	Very loose brown intermixture of cinders, gravel, organic matter, miscellaneous trash and rubble
			1			
			1		4.0	
5			1		5.0	- FILL -
			0	S2		
			0			
			1		7.0	
10			2		10.0	
			1	S3		
			1		12.0	
					12.5	
			1			
			1	S4		
	14.5		1		14.5	
15						Medium stiff gray organic CLAYEY SILT, little fine sand, trace shells
					16.0	
				U1		- grading to -
					18.0	
20					20.0	
				U2		Soft dark gray organic SILTY CLAY, many shells
					22.0	
	24.0					
25					25.0	Gray fine sand, some clayey silt (medium-stiff) slightly organic
				U3	26.0	
			4	S5	26.5	
			8			Very stiff mottled yellow-gray CLAY
			9	S6	27.5	
			18	S7	28.0	
30						Bottom of Boring

BLOWS/FT.	DENSITY
0-4	VERY LOOSE
4-10	LOOSE
10-30	MEDIUM COMPACT
30-50	COMPACT
50+	VERY COMPACT

BLOWS/FT.	CONSISTENCY
0-2	VERY SOFT
2-4	SOFT
4-8	MEDIUM STIFF
8-15	STIFF
15-30	VERY STIFF

SAMPLE IDENTIFICATION	
S	SPLIT SPOON
T	THIN WALL TUBE
U	UNDISTURBED PISTON
O	OPEN END ROD
W	WASH SAMPLE

SUMMARY
OVERBURDEN: 28.0'
ROCK:
SAMPLES: 7S - 3T
HOLE NO. U33

HALEY & ALDRICH, INC.
CONSULTING SOIL ENGINEERS

TEST BORING REPORT

HOLE NO. U-34

PROJECT: Greater Boston Wholesale Market Association
CLIENT: C. T. Main, Inc.
CONTRACTOR: New England Test Boring

FILE NO. 65-1409
SHEET NO. 1 of 2
LOCATION: See Figure 1
ELEVATION: 13.6 ±
DATE START: 9-14-65
DATE FINISH: 9-14-65
DRILLER: A. Chiradonna
INSPECTOR: D. Woodhouse

GROUNDWATER		DEPTH TO:		
DATE	TIME	WATER	BOTTOM OF CASING	BOTTOM OF HOLE
9-14	6:30PM	5.5'		41

	CASING	SAMPLER	CORE BARREL
TYPE:		S	T
SIZE I.D.:	4"	1 3/8'	2.8"
HAMMER WT.:	300#	140#	
HAMMER FALL:	18"	30"	

SCALE IN FEET	STRATA CHANGE	CASING BLOWS PER FOOT	SAMPLER BLOWS PER 6 INCHES	SAMPLE NUMBER	SAMPLE DEPTH RANGE	FIELD CLASSIFICATION AND REMARKS
0			5 5 6 5	S1	2.0	Loose, black intermixture of wood, organic matter, cinders, miscellaneous rubble and trash
					4.0	- FILL -
5			3 3 2 1	S2	5.0	
					7.0	
10			4 2 2 2	S3	10.0	
					12.0	
15			1 1 1 1	S4	15.0	
	16.0				17.0	Very soft gray organic SILT, trace fine sand, trace shells, trace fibers (plastic-strong organic odor)
				U1	18.0	- contaminated by above FILL -
20					20.0	Soft dark gray organic CLAY, traces miscellaneous fill
					23.0	
				U2		
25					25.0	- with zones of organic SILTY CLAY and CLAYEY SILT; increasing fine sand with depth
					27.0	
				U3		
30					29.0	

BLOWS/FT.	DENSITY
0-4	VERY LOOSE
4-10	LOOSE
10-30	MEDIUM COMPACT
30-50	COMPACT
50+	VERY COMPACT

BLOWS/FT.	CONSISTENCY
0-2	VERY SOFT
2-4	SOFT
4-8	MEDIUM STIFF
8-15	STIFF
15-30	VERY STIFF

SAMPLE IDENTIFICATION	
S	SPLIT SPOON
T	THIN WALL TUBE
U	UNDISTURBED PISTON
O	OPEN END ROD
W	WASH SAMPLE

SUMMARY
OVERBURDEN: 41.0'
ROCK:
SAMPLES: 7S - 1T
HOLE NO. U34

HALEY & ALDRICH, INC.
CONSULTING SOIL ENGINEERS

TEST BORING REPORT

HOLE NO. U-34

PROJECT: Greater Boston Wholesale Market Association
CLIENT: C. T. Main, Inc.
CONTRACTOR: New England Test Boring

FILE NO. 65-1409
SHEET NO. 2 of 2
LOCATION:
ELEVATION:
DATE START:
DATE FINISH:
DRILLER:
INSPECTOR:

GROUNDWATER		DEPTH TO:		
DATE	TIME	WATER	BOTTOM OF CASING	BOTTOM OF HOLE

	CASING	SAMPLER	CORE BARREL
TYPE:			
SIZE I.D.:			
HAMMER WT.:			
HAMMER FALL:			

SCALE IN FEET	STRATA CHANGE	CASING BLOWS PER FOOT	SAMPLER BLOWS PER 6 INCHES	SAMPLE NUMBER	SAMPLE DEPTH RANGE	FIELD CLASSIFICATION AND REMARKS
30				NR	30.0	Soft dark brown organic CLAYEY SILT, some fine sand; layer of shells at 30'
			1 1 1	S5	32.0	
					34.0	
35						
				U4	37.0	
			4 4	S6	39.0	Medium compact gray silty fine SAND, (slightly organic)
40			12 13	S7	40.0	
					41.0	Bottom of Boring
45						
50						
55						
60						

BLOWS/FT.	DENSITY
0-4	VERY LOOSE
4-10	LOOSE
10-30	MEDIUM COMPACT
30-50	COMPACT
50+	VERY COMPACT

BLOWS/FT.	CONSISTENCY
0-2	VERY SOFT
2-4	SOFT
4-8	MEDIUM STIFF
8-15	STIFF
15-30	VERY STIFF

SAMPLE IDENTIFICATION	
S	SPLIT SPOON
T	THIN WALL TUBE
U	UNDISTURBED PISTON
O	OPEN END ROD
W	WASH SAMPLE

SUMMARY
OVERBURDEN: 41.0'
ROCK:
SAMPLES: 7S - 4T
HOLE NO. U34

HALEY & ALDRICH, INC.
CONSULTING SOIL ENGINEERS

TEST BORING REPORT

HOLE NO. U-35

PROJECT: Greater Boston Wholesale Market Association
CLIENT: C. T. Main, Inc.
CONTRACTOR: New England Test Boring

FILE NO. 65-1409
SHEET NO. 1 of 1
LOCATION: See Figure 1
ELEVATION: 14.0 ±
DATE START: 9-15-65
DATE FINISH: 9-15-65
DRILLER: A. Chiradonna
INSPECTOR: D. Woodhouse

GROUNDWATER		DEPTH TO:		
DATE	TIME	WATER	BOTTOM OF CASING	BOTTOM OF HOLE
9-15	1:00PM	6'	15'	22'

	CASING	SAMPLER	CORE BARREL
TYPE:		S	T
SIZE I.D.:	4"	1 3/8"	2.8"
HAMMER WT.:	300#	140#	
HAMMER FALL:	18"	30"	

SCALE IN FEET	STRATA CHANGE	CASING BLOWS PER FOOT	SAMPLER BLOWS PER 6 INCHES	SAMPLE NUMBER	SAMPLE DEPTH RANGE	FIELD CLASSIFICATION AND REMARKS
0			3 3 2 3	S1	2.0 4.0	Loose, brown-black intermixture of topsoil, organic matter, cinders, miscellaneous rubble and trash - FILL -
5			2 2 1 1	S2	5.0 7.0	
10			1 1 1 1	S3	10.0 12.0	
15	15.0		1 1	S4	15.0 16.0	Soft, to medium stiff gray organic CLAYEY SILT, trace fine sand, trace shells
				U1	18.0	
20	20.0		5 6 8 12	S5	20.0 22.0	Medium compact gray slightly organic silty medium to fine SAND, trace coarse sand Bottom of Boring
25						
30						

BLOWS/FT.	DENSITY
0-4	VERY LOOSE
4-10	LOOSE
10-30	MEDIUM COMPACT
30-50	COMPACT
50+	VERY COMPACT

BLOWS/FT.	CONSISTENCY
0-2	VERY SOFT
2-4	SOFT
4-8	MEDIUM STIFF
8-16	STIFF
16-30	VERY STIFF

SAMPLE IDENTIFICATION	
S	SPLIT SPOON
T	THIN WALL TUBE
U	UNDISTURBED PISTON
O	OPEN END ROD
W	WASH SAMPLE

SUMMARY
OVERBURDEN: 22.0'
ROCK:
SAMPLES: 5S - 1T
HOLE NO. U35

NEW ENGLAND TEST BORING CORP.

Telephone LAfayette 3-1150 — **TEST BORING REPORT** — BOSTON, MASSACHUSETTS

To Chas. T. Main, Inc. Date 9/22/65 Job No. 3348

Location Greater Boston Wholesale Market Assoc., South Bay Area Scale 1"= ft.

Figures in right hand column indicate number of blows required to drive 2 inch sampling spoon 1 foot, using 140-lb. weight falling 30 inches.

BORING #1
Elev. 17.8

W.L.	loose sand, gravel, boulder & cinders fill	7
16'	SOFT TO MEDIUM GRAY CLAY, trace of silt	5
21'	SOFT GRAY ORGANIC SILT & sea shells	3
32'6"	MEDIUM TO COARSE GRAY SAND, TRACE GRAVEL, trace of silt	12
50'	COMPACT FINE TO MEDIUM YELLOW SAND	29
55'	FINE GRAY SAND & SILT, trace of clay	13
75'	Water level -12'	

BORING #2
Elev. 16.7

W.L.	loose sand, gravel & cinders fill	2
14'6"	VERY SOFT SILT	1
16'	SOFT GRAY ORGANIC SILT, trace of sea shells	2
39'6"	COMPACT MEDIUM GRAY SAND, trace of silt & gravel	25
45'6"	Water level -11'6"	

BORING #3
Elev. 14.7

	loose sand, gravel, cinders & Misc. fill	3
9'6"	VERY SOFT CLAY, SILT, trace of peat	1
W.L. 15'	SOFT GRAY ORGANIC SILT & sea shells	2
34'6"	FINE GRAY SAND, some gravel, trace of clay	24
47'	FINE TO MEDIUM GRAY SAND, trace of clay & silt	17
62'	Water level -13' 6"	

Water levels indicated are those observed at the completion of each boring, and do not necessarily represent permanent ground water levels.

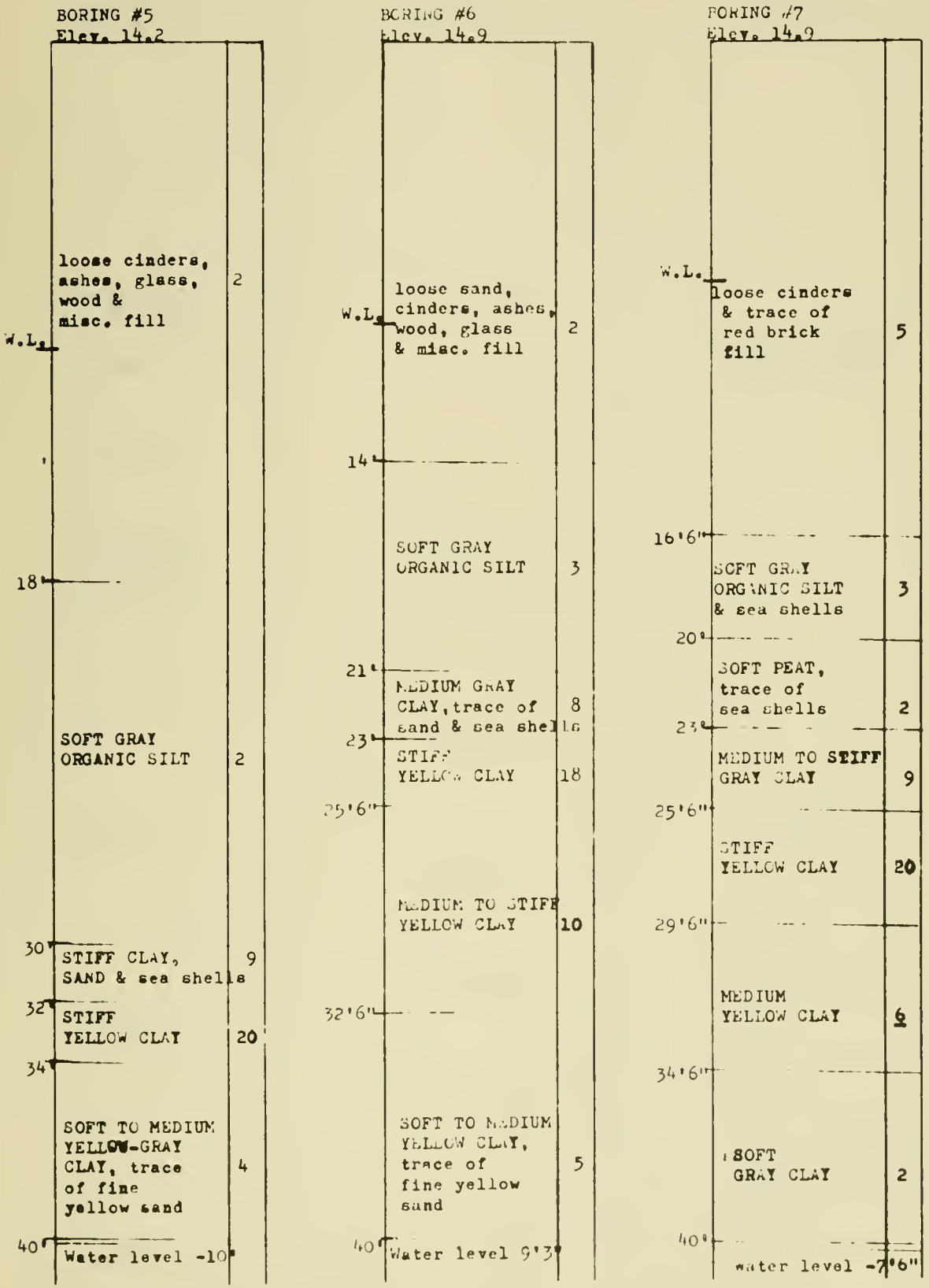
NEW ENGLAND TEST BORING CORP.

Telephone LAfayette 3-1150 — **TEST BORING REPORT** — BOSTON, MASSACHUSETTS

To Chas. T. Main, Inc. Date 9/22/65 Job No. 3348

Location Greater Boston Wholesale Market Assoc., South Bay Area Scale 1"= ft.

Figures in right hand column indicate number of blows required to drive 2 inch sampling spoon 1 foot, using 140-lb weight falling 30 inches.



Water levels indicated are those observed at the completion of each boring, and do not necessarily represent permanent ground water levels.

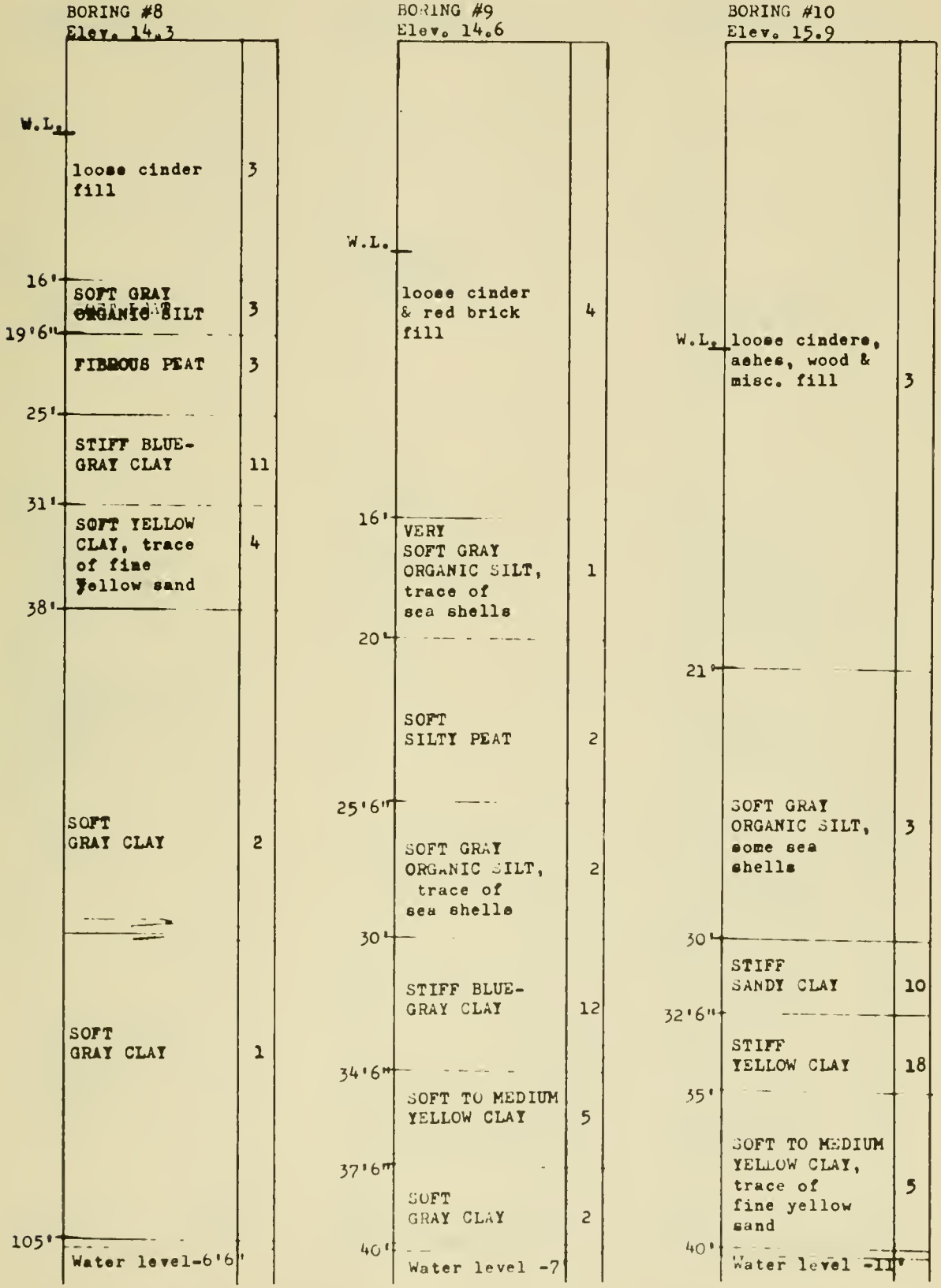
NEW ENGLAND TEST BORING CORP.

Telephone LAfayette 3-1150 — **TEST BORING REPORT** — BOSTON, MASSACHUSETTS

To Chas. T. Main, Inc. Date 9/22/65 Job No. 3348

Location Greater Boston Wholesale Market Assc., South Bay Area Scale 1"= ft.

Figures in right hand column indicate number of blows required to drive 2 inch sampling spoon 1 foot, using 140-lb. weight falling 30 inches.



Water levels indicated are those observed at the completion of each boring, and do not necessarily represent permanent ground water levels.

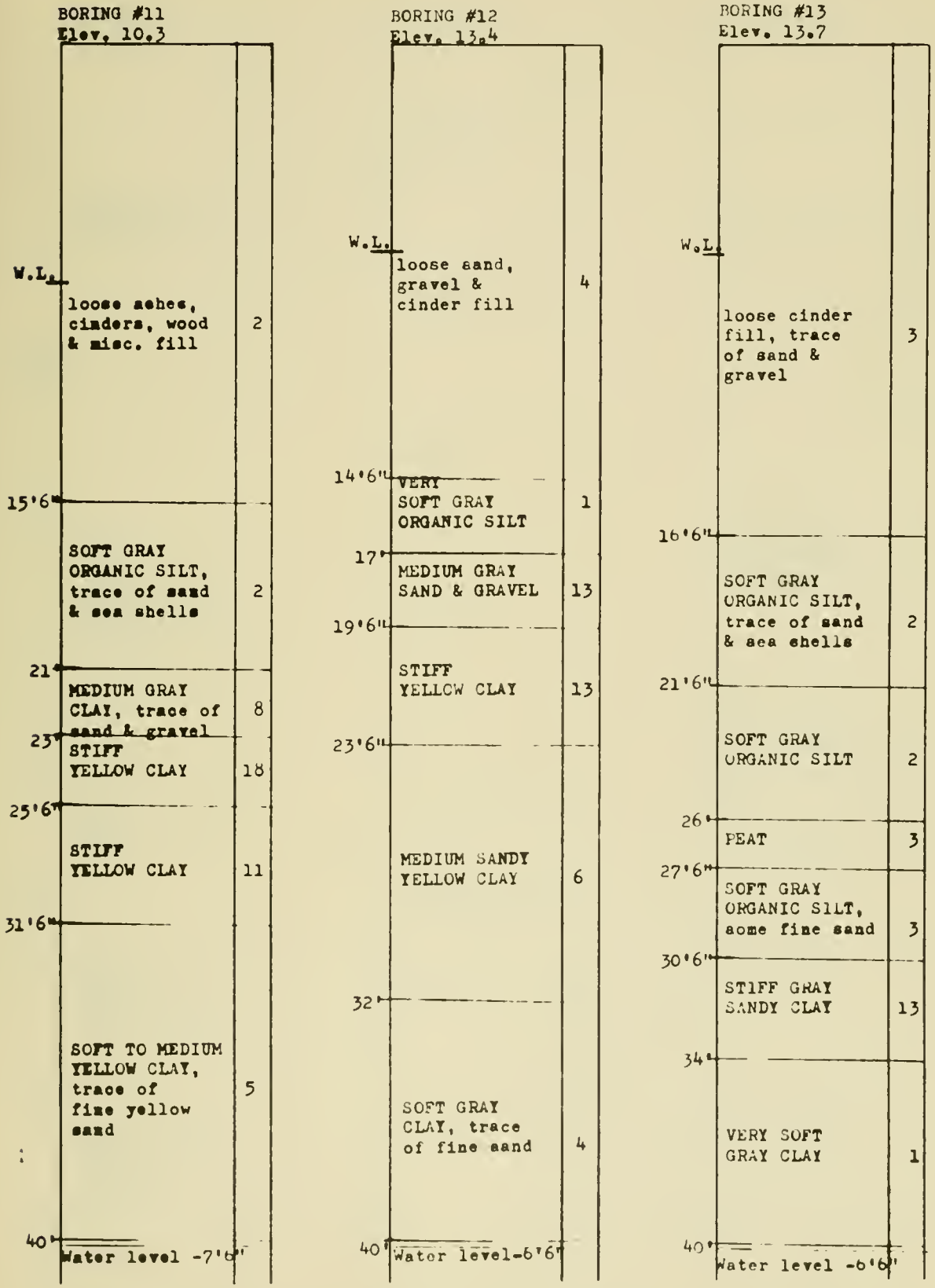
NEW ENGLAND TEST BORING CORP

Telephone LAfayette 3-1150 — **TEST BORING REPORT** — BOSTON, MASSACHUSETTS

To Chas. T. Main, Inc. Date 9/22/65 Job No. 3348

Location Greater Boston Wholesale Market Assc., South Bay Area Scale 1"= ft.

Figures in right hand column indicate number of blows required to drive 2 inch sampling spoon 1 foot, using 140-lb. weight falling 30 inches.



Water levels indicated are those observed at the completion of each boring, and do not necessarily represent permanent ground water levels.

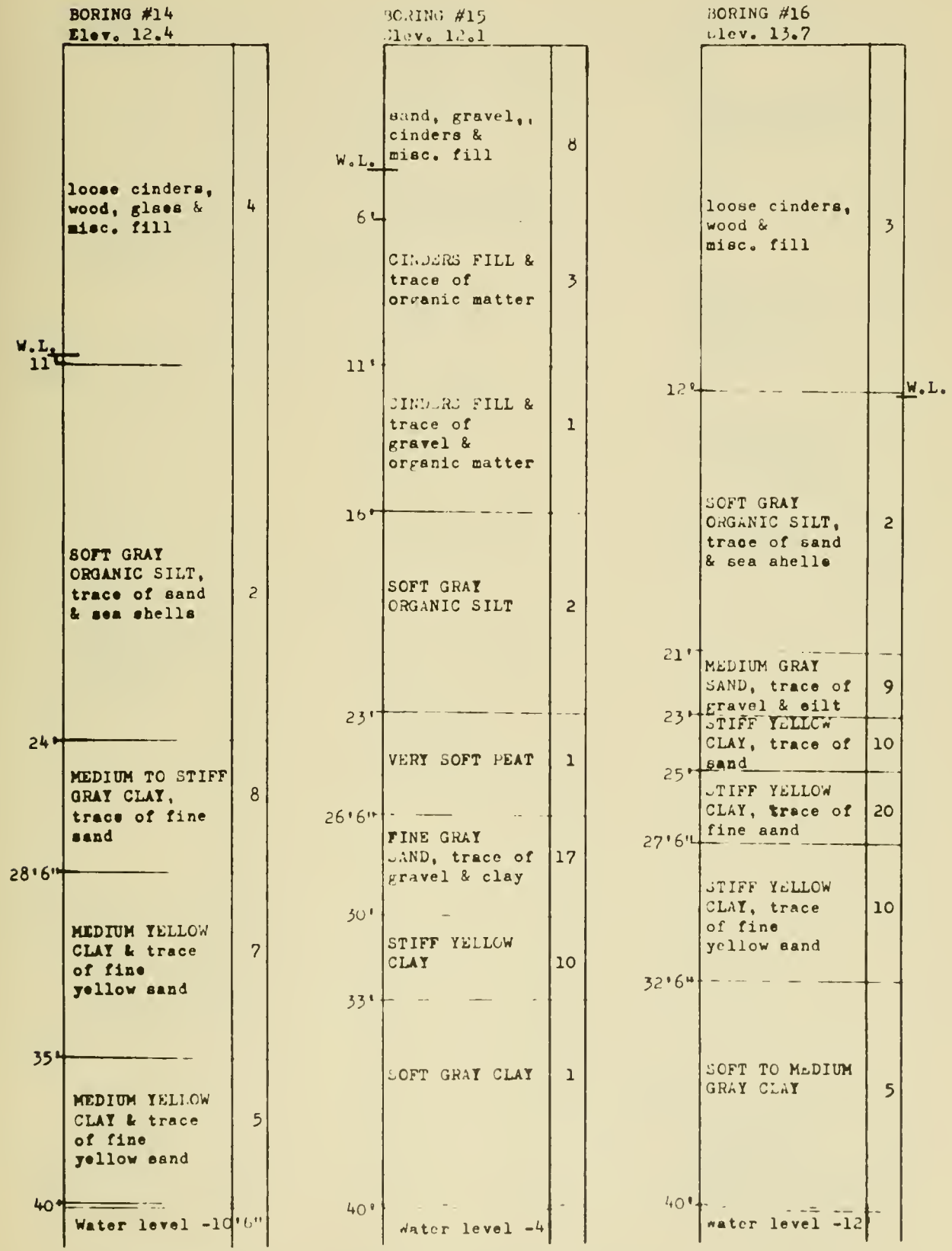
NEW ENGLAND TEST BORING CORP.

Telephone LAfayette 3-1130 — TEST BORING REPORT — BOSTON, MASSACHUSETTS

To Chas. T. Main, Inc. Date 9/22/65 Job No. 3348

Location Greater Boston Wholesale Market Assoc., South Bay Area Scale 1"= ft.

Figures in right hand columns indicate number of blows required to drive 2 inch sampling spoon 1 foot, using 140-lb weight falling 30 inches.



Water levels indicated are those observed at the completion of each boring, and do not necessarily represent permanent ground water levels.

NEW ENGLAND TEST BORING CORP.

Telephone LAfayette 3-1130 — **TEST BORING REPORT** — BOSTON, MASSACHUSETTS

To Chas. T. Main, Inc. Date 9/22/65 Job No. 3348

Location Greater Boston Wholesale Market Assc., South Bay Area Scale 1"= ft.

Figures in right hand column indicate number of blows required to drive 2-inch sampling spoon 1 foot, using 140-lb weight falling 30 inches.

BORING #17
Elev. 12.3

	loose cinders, wood, glass & misc. fill	3
W.L. 11'6"		
	SOFT GRAY ORGANIC SILT, trace of fine gray sand & sea shells	2
30'6"		
	MEDIUM TO COARSE GRAY SAND, trace of silt	10
32'6"		
	MEDIUM GRAY CLAY trace of fine gray sand	8
34'6"		
	MEDUM GRAY CLAY, trace of fine gray sand	5
40'		
	Water level -11'	

BORING #18
Elev. 14.5

	sand, gravel & cinders fill	7
W.L. 7'		
	loose cinders, gravel, wood & misc. fill	2
15'6"		
	SOFT GRAY ORGANIC SILT, trace of sea shells	3
23'		
	FIRM COARSE GRAY SAND & GRAVEL	11
28'		
	FIRM MEDIUM TO COARSE GRAY SAND & GRAVEL	20
38'6"		
	STIFF GRAY CLAY trace of sand	12
41'		
	MEDIUM TO SOFT GRAY CLAY, trace of fine sand	5
50'		
	Water level -6	6"

BORING #19
Elev. 12.3

W.L.		
	loose sand, gravel, cinders & misc. fill	3
11'		
	SOFT GRAY ORGANIC SILT, trace of fine sand	1½
25'		
	SOFT GRAY ORGANIC SILT, trace of sand & sea shells	3
32'		
	STIFF YELLOW CLAY	11
35'		
	SOFT GRAY CLAY	2
90'6"		
	COMPACT COARSE GRAY SAND, GRAVEL, BOULDERS & trace of clay	43
96'		
	Water level -2' *Refusal*	

Water levels indicated are those observed at the completion of each boring, and do not necessarily represent permanent ground water levels.

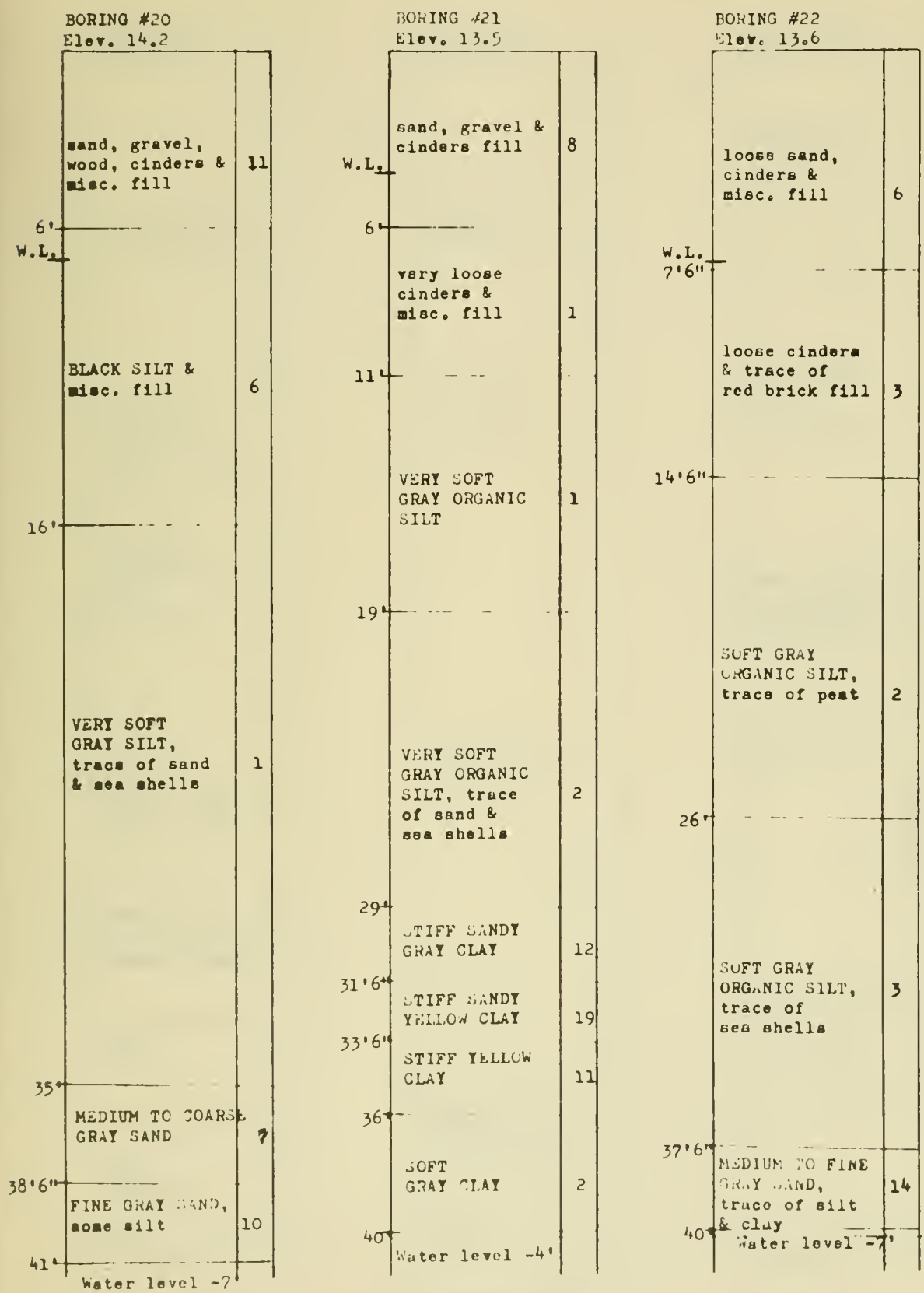
NEW ENGLAND TEST BORING CORP.

Telephone LAfayette 3-1150 — **TEST BORING REPORT** — BOSTON, MASSACHUSETTS

To Chas. T. Main, Inc. Date 9/22/65 Job No. 3348

Location Greater Boston Wholesale Market Assoc., South Bay Area Scale 1"= ft.

Figures to right hand column indicate number of blows required to drive 2 inch sampling spoon 1 foot, using 140-lb. weight falling 30 inches.



Water levels indicated are those observed at the completion of each boring and do not necessarily represent permanent ground water levels.

NEW ENGLAND TEST BORING CORP.

Telephone LAfayette 3-1150 — **TEST BORING REPORT** — BOSTON, MASSACHUSETTS

To Stone & Main, Inc. Date 9/22/65 Job No. 3348

Location Greater Boston Wholesale Market Assoc., South Bay Area Scale 1"=___ft.

Figures in right hand column indicate number of blows required to drive 2 inch sampling spoon 1 foot, using 140-lb. weight falling 30 inches.

BORING #23
Elev. 13.3

W.L.	sand, gravel & red brick fill	6
11'	SOFT GRAY ORGANIC SILT, trace of fill	2
15'	VERY SOFT GRAY ORGANIC SILT	1
19'	SOFT GRAY ORGANIC SILT, trace of sand & sea shells	2
28'	VERY STIFF YELLOW CLAY, trace of sand	21
30'6"	STIFF YELLOW CLAY	13
36'	SOFT GRAY CLAY	3
40'	Water level -7'	

BORING #24
Elev. 12.0

W.L.	sand, gravel, bricks & cinders fill	5
10'	VERY SOFT GRAY SILT, trace of clay	1
14'	SOFT GRAY ORGANIC SILT, some sea shells	2
35'	MEDIUM TO SOFT GRAY CLAY, trace of sand	5
39'	SOFT GRAY CLAY	2
42'	Water level -3'	

BORING #25
Elev. 13.2

W.L.	loose sand, gravel & cinder fill	4
11'	VERY SOFT GRAY ORGANIC SILT & SEA SHELLS	1
35'	SAND, GRAVEL & trace of silt	11
37'	MEDIUM CLAY, trace of silt	7
40'	SOFT GRAY CLAY, trace of fine sand	4
55'	SOFT GRAY CLAY, TRACE of fine sand	3
100'	Water level -5'	

Water levels indicated are those observed at the completion of each boring, and do not necessarily represent permanent ground water levels.

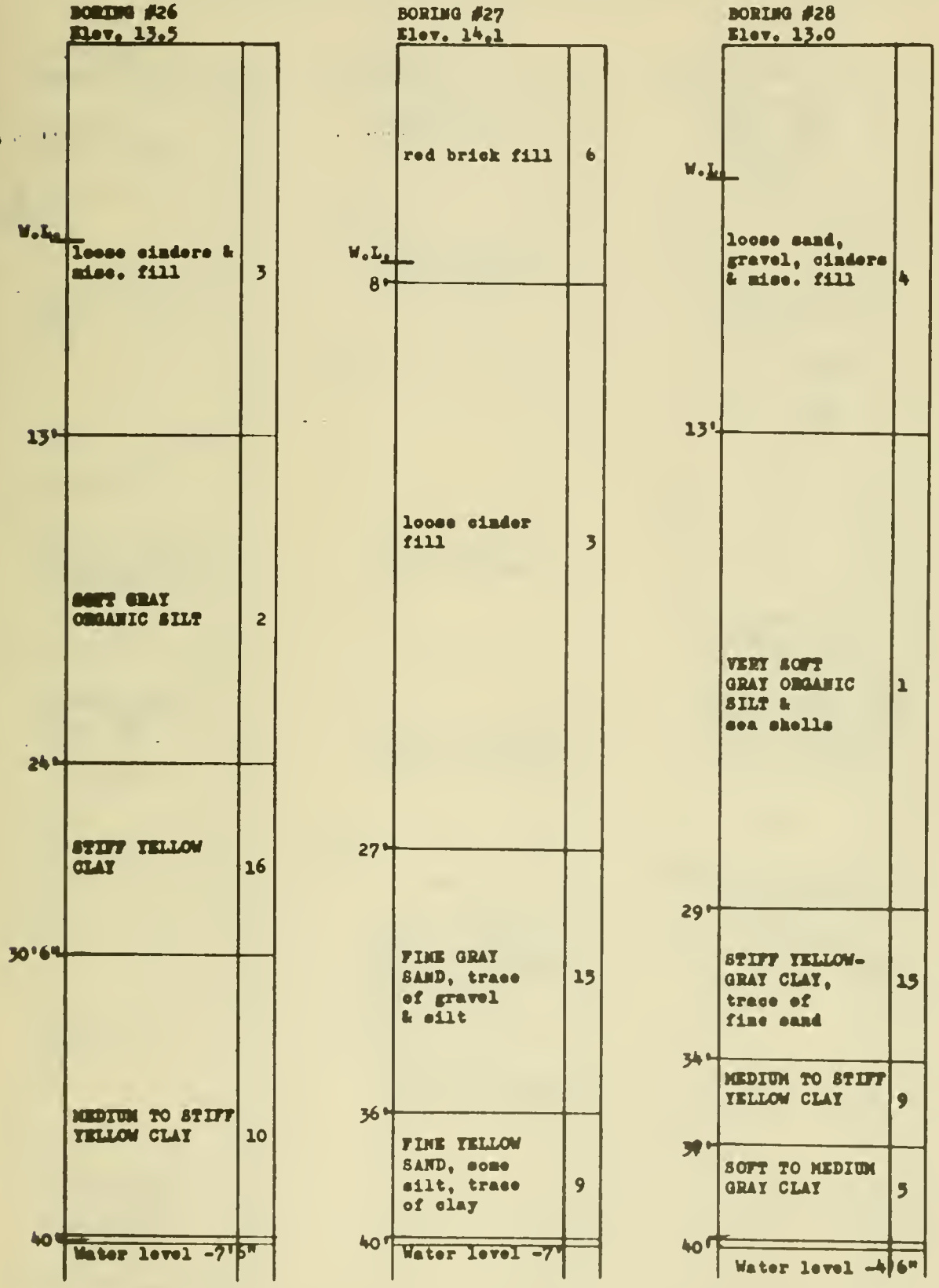
NEW ENGLAND TEST BORING CORP.

Telephone LAfayette 3-1190 — TEST BORING REPORT — BOSTON, MASSACHUSETTS

To Chas. T. Main, Inc. Date 9/22/65 Job No. 3348

Location Greater Boston Wholesale Market Assoc., South Bay Area Scale 1"= ft.

Figures in right hand column indicate number of blows required to drive 2-inch sampling spoon 1 foot, using 140-lb. weight falling 30 inches.



Water levels indicated are those observed at the completion of each boring, and do not necessarily represent permanent ground water levels.

NEW ENGLAND TEST BORING CORP.

Telephone LAfayette 3-1150 — TEST BORING REPORT — BOSTON, MASSACHUSETTS

To Chas. T. Main, Inc. Date 9/22/65 Job No. 3348

Location Greater Boston Wholesale Market Assc., South Bay Area Scale 1"= ft.

Figures in right hand column indicate number of blows required to drive 2 inch sampling spoon 1 foot, using 140-lb. weight falling 30 inches.

BORING #30
Elev. 14.4

0'	cinders & misc. fill	7
8' W.L.		
	loose cinder fill	2
24'		
	ashes fill	8
30'		
	SOFT TO MEDIUM GRAY CLAY	6
38'		
	SOFT TO MEDIUM GRAY CLAY	5
110'		
	SOFT GRAY CLAY	2
144'		
	COMPACT YELLOW SAND, GRAVEL & BOULDERS	40
150'		
	Water level -8'3"	

BORING # U-31
Elev. 12.5

0'0"	VERY LOOSE YELLOW-BROWN CINDER FILL (dry)	3
5'0"		
W.L.	VERY LOOSE DARK-BROWN CINDERS AND MISC. FILL (moist)	2
10'0"		
	VERY SOFT DARK-YELLOW ORGANIC SILT, some misc. fill (wet)	1
	3" O.D. Shelby Tube Sample Taken from 15'0" to 17'0".	
26'0"		
	soft silt	
	3" O.D. Shelby Tube Sample Taken from 26'6" to 28'6"---lost shelby sample	
30'0"	LOOSE FINE TO MEDIUM SILTY GRAY SAND, trace of clay (wet)	9
32'0"		
	Water Level -7'0"	

BORING # U-32
Elev. 13.8

0'0"	LOOSE YELLOW-BROWN ASHES & CINDER FILL 2-1-2-2 / 6"	
5'0"		
W.L.	LOOSE DK-BROWN CINDERS & MISC. FILL 5'-7': 1-2-1-1 / 6" 11'-13': 1-1 / 12" (wet)	
15'0"		
	VERY SOFT DARK-YELLOW ORGANIC SILT (wet)	1
	3" O.D. Shelby Tube Samples Taken from 17'0" to 19'0" & 22'0" to 24'0".	
26'6"		
	MEDIUM TO STIFF SILTY BLUE-GRAY CLAY 5-6-8-8/6"	
28'6"		
	Water Level -6'6"	

Water levels indicated are those observed at the completion of each boring, and do not necessarily represent permanent ground water levels.

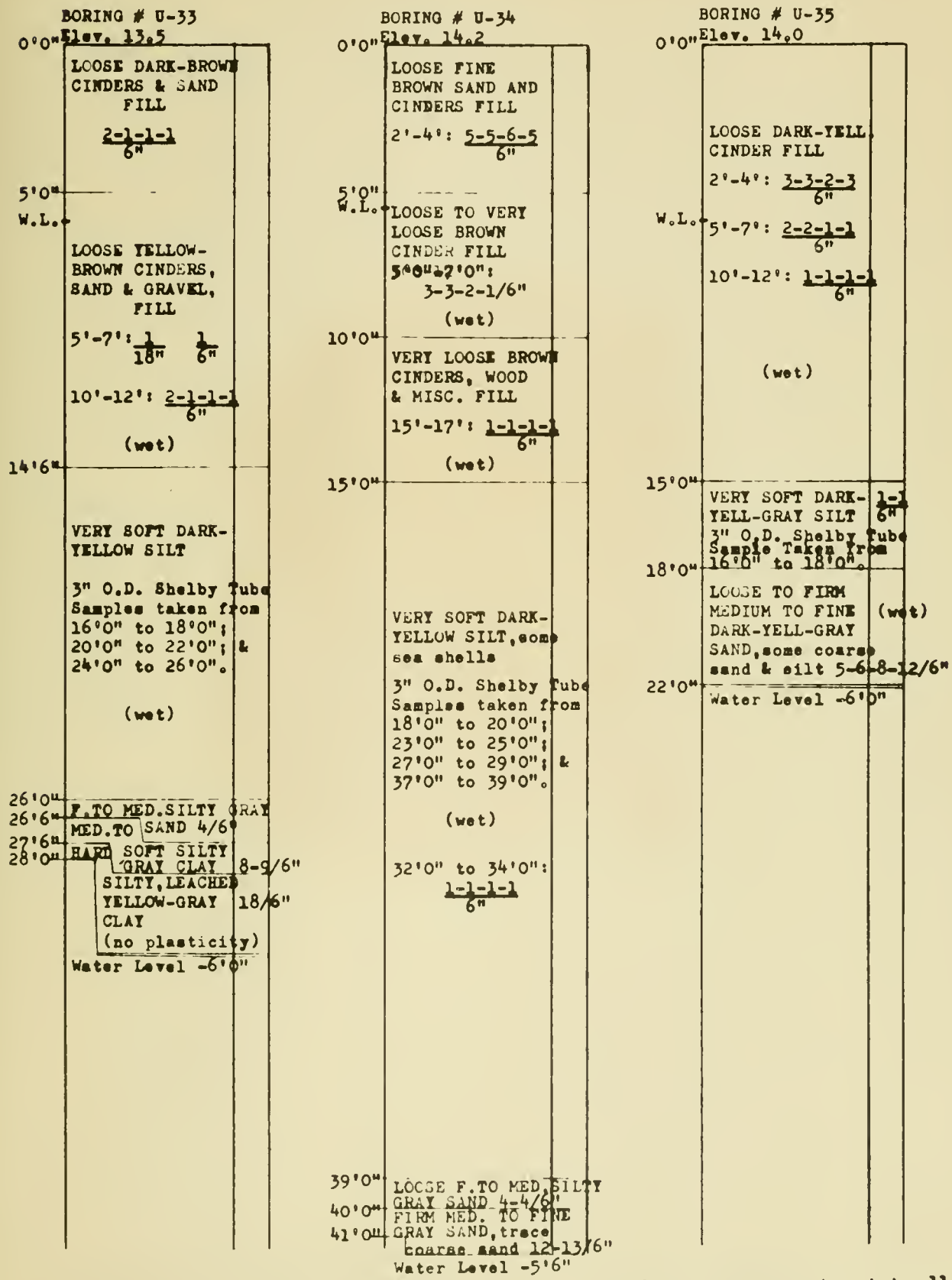
NEW ENGLAND TEST BORING CORP.

Telephone LAfayette 3-1150 — TEST BORING REPORT — BOSTON, MASSACHUSETTS

To Chas. T. Main, Inc. Date 9/22/65 Job No. 3348

Location Greater Boston Wholesale Market Assoc., South Bay Area Scale 1"= 4 ft.

Figures in right hand column indicate number of blows required to drive 2 inch sampling spoon 1 foot, using 140-lb. weight falling 30 inches.



Water levels indicated are those observed at the completion of each boring, and do not necessarily represent permanent ground water levels.

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